SOIL SURVEY

Dauphin County Pennsylvania

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
THE PENNSYLVANIA STATE UNIVERSITY
Agricultural Experiment Station and Agricultural Extension Service
and
THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE
State Soil and Water Conservation Commission
Issued 1972

Major fieldwork for this soil survey was done in the period 1960–65. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1965. This survey was made cooperatively by the United States Department of Agriculture, Soil Conservation Service; The Pennsylvania State University, Agricultural Experiment Station and Agricultural Extension Service; and the Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission. This survey is part of the technical assistance furnished to the Dauphin County Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or copies can be purchased on individual order from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Dauphin County contains information that can be applied in managing farms and woodland; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, or recreation.

Locating Soils

All the soils of Dauphin County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in this survey. The guide lists all of the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay on the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units.

Foresters and others can refer to the section "Use of Soils as Woodland," where the potential productivity, suitable trees, and hazards to managing woodland are given for the soils in the county.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Use of Soils in Community Development."

Engineers and builders can find, under "Engineering Uses of Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of Soils."

Students, teachers, and others will find information about the soils and their management in various parts of the text, depending on their particular interests.

Newcomers in Dauphin County may be especially interested in the section "General Soil Map," where broad patterns of soils are described.

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

Contents

Issued February 1972

SOIL SURVEY OF DAUPHIN COUNTY, PENNSYLVANIA

BY W. MERRILL KUNKLE, GARLAND H. LIPSCOMB, AND RICHMOND KINNARD, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE PENNSYLVANIA STATE UNIVERSITY, AGRICULTURAL EXPERIMENT STATION AND AGRICULTURAL EXTENSION SERVICE, AND THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE, STATE SOIL AND WATER CONSERVATION COMMISSION

DAUPHIN COUNTY is in southeastern Pennsylvania, within easy driving distance of Baltimore, Philadelphia, the District of Columbia, and New York City. The northern half of the county, from Blue Mountain northward, is in the Appalachian Ridge and Valley section; and the southern half is in the Low Piedmont section (fig. 1). The land area is 520 square

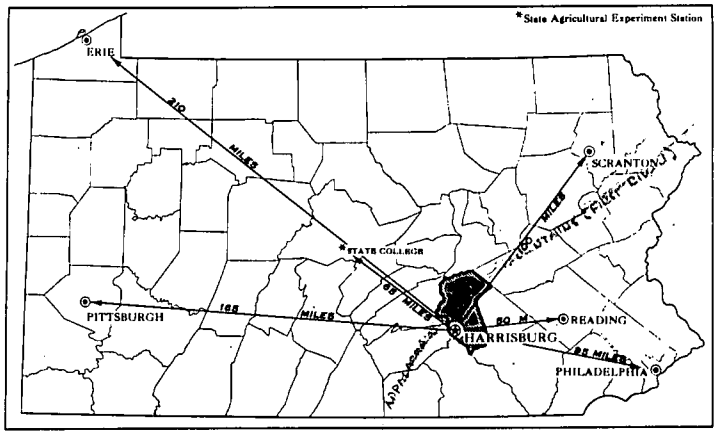


Figure 1.—Location of Dauphin County in Pennsylvania.

miles, or 332,800 acres, and the population according to the U.S. Census was 220,255 in 1959. Harrisburg, population 79,697, is the county seat and capital of the State. Within a 15-mile radius of Harrisburg live approximately 225,000 people. This number, however, includes the populations of several towns in adjoining Cumberland County.

In 1705, the first settler arrived near what is now Paxtang, and by 1749 the entire county had been purchased from the Indians. In 1825, coal was discovered in Lykens Valley, and some coal is still mined there.

Most early farming was in the southern part of the county on cleared land that the Indians had used for corn. Although most of the farmland now is south of Blue Mountain, considerable farmland is east of Millersburg in the northern part of the county and in the intermountain valleys east of Halifax at the center of the county. The soils along the Susquehanna River and in the limestone areas near Hershey and Hummelstown are highly productive. Dairying is the principal farming enterprise in the county.

According to the 1964 Census of Agriculture, 815 farms in Dauphin County reported that 34,280 cattle, hogs, or sheep were on hand. Cattle and calves numbered 22,716. Of these, there were 10,072 cows and heifers that had calved, 5,520 other heifers and heifer calves, and 7,124 steers and bulls, including calves. Cows milked amounted to 8,914, and there was 78,986,496 pounds of whole milk sold. Hogs and pigs numbered 9,896, and sheep and lambs 1,688. Also in the county were 370,274 chickens 4 months old or older.

In 1964, the acreages of principal crops harvested were as follows: Corn for grain, 16,467; corn for silage, 3,899; wheat, 9,620; oats for grain, 6,071. In addition, there were 11,829 acres of alfalfa and alfalfa mixtures cut for hay, and 12,836 acres of clover, timothy, and mixtures of clover and grasses.

Important industries, mainly in and around Harrisburg, are a source of steady income for many families in the county. These industries include steel companies and their subsidiaries, paper manufacturers, and candy factories. Several railroads have their headquarters in this part of the county, and other businesses hire smaller numbers of people.

Major railroads, airlines, trucklines, and buses provide the county with shipping facilities and transportation. The Pennsylvania Turnpike, which crosses from Steelton to Lebanon County, provides easy access to the southern part of the county. The northern part is crossed by State Routes 25 and 225, which have good transfer connections to mainly traveled routes throughout the State. Available to all farm areas are blacktop, all-weather roads. The few remaining unpaved roads are in forested areas.

The water supply in Dauphin County is limited. Harrisburg obtains most of its water supply from the De Hart Dam in Clarks Valley and, in emergency, obtains supplemental water from the Susquehanna River. Halifax is supplied with spring water from Peters Mountain and from wells. Communities east of Harrisburg, Highspire, and Hummelstown are supplied from wells and from Swatara, Stony, and Beaver Creeks. Most small towns use surface water that is supplemented by wells in emergencies. Gratz uses

spring water from nearby mountains, and farmers and rural residents rely on wells and springs.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Dauphin County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Hagerstown and Klinesville, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded, is one of several phases within the Hagerstown series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soils of other kinds that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units, soil complexes and undifferentiated groups, are shown on the soil map of Dauphin County.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Urban land, shale materials, is a land type in Dauphin County.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

The soil scientists set up trial groups of soils on the basis of yield and practice tables and other data they have collected. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Dauphin County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in Dauphin County, who want to compare different parts of the county, or who want to know the location of large tracts that are

suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The eight soil associations in Dauphin county are described in the following pages.

1. Dekalb-Lehew Association

Moderately deep, well-drained, gently sloping to very steep soils that have a channery sandy loam to channery loam subsoil; on upper mountain slopes and ridges

This association occurs almost entirely on the upper slopes, ridges, and flats of the Blue, Stony, Peters, Berry, Short, and Mahantango Mountains in the northern half of Dauphin County. These mountains are nearly all forested, and the soils are stony or very stony in most places. Slopes range from gentle to very steep.

This association makes up about 28 percent of the county. About 60 percent of the association is Dekalb soils, 13 percent is Lehew soils, and 27 percent is very stony land, Laidig soils, and other minor soils. The Dekalb and Lehew soils are closely intermingled.

The Dekalb soils have a very stony or channery surface layer and a channery sandy loam subsoil. Sandstone bedrock is at a depth of 2 to 3½ feet. The Lehew soils have a surface layer of very stony sandy loam. The subsoil is channery sandy loam and channery loam, and it is underlain by very gravelly loam. Sandstone bedrock is at a depth of 2 to 3½ feet.

Because of the low available moisture capacity and stoniness, the Dekalb and Lehew soils are poorly suited to cultivated crops. They are fairly well suited to moderately well suited as woodland. The main trees are white, red, black, and chestnut oaks, and there is some birch.

2. Calvin-Leck Kill-Klinesville Association

Deep to shallow, dominantly well drained, gently sloping and sloping soils that have a shaly silt loam subsoil; in upland areas between mountains

This association consists of cleared soils that lie between mountain ranges that are 600 to 800 feet higher than the valley (fig. 2). The large streams, which now drain the entire valley, originated at the base of the mountains as numerous small streams that eventually cut channels 50 to 100 feet deep.

The largest area of this association is north of Berry Mountain and extends from Millersburg through Gratz to the Schuylkill County line. Another fairly large area is north and east of Halifax. The soils in this association developed in material weathered from red shale and sandstone.

This association makes up about 30 percent of the county. About 50 percent of the association is Calvin soils, 20 percent is Leck Kill soils, 10 percent is Klinesville soils, and 20 percent is minor soils. The Calvin and Leck Kill soils are closely intermingled.

The Calvin soils are moderately deep, are well drained, and have moderate to low available moisture capacity. They have little clay in the subsoil. The Leck Kill soils are deep, are well drained, and have moderate available moisture capacity. The Klinesville soils are shallow, are well drained, and are droughty. They generally have the steepest slopes in the association.

The minor soils in this association are the Barbour, Basher, Atkins, and Albrights soils. The Barbour, Basher, and Atkins soils occur on the flood plains. The Albrights soils formed in colluvial materials and occur at the base of slopes.

Except for the Klinesville soils, most areas of the major soils in this association are used for cultivated crops. A few areas of Klinesville soils are cultivated, but most areas are used as pasture or are forested.

3. Laidig-Buchanan-Andover Association

Deep, well-drained to poorly drained, gently sloping and sloping soils that have a fragipan; on lower mountain slopes

This association occurs in the northern half of Dauphin County on the lower, less steep parts of high, steep mountains and in narrow mountain coves where colluvium has accumulated. The Laidig and Buchanan soils are sloping to gently sloping. They occupy about the same position on the slopes, though in many places the Buchanan soils are just below the Laidig. The Andover soils are nearly level or gently sloping. They are at or near the base of mountains, just below the Buchanan soils. Because Andover soils receive seepage from higher areas throughout the year, they are saturated most of the time.

This association makes up about 13 percent of the county. About 90 percent of the association is Laidig soils, 6 percent is Buchanan soils, and 4 percent is Andover soils.

The Laidig soils are deep, are well drained, and have a mostly reddish-yellow subsoil. Clay has accumulated in the layers below the surface layer. Available moisture capacity is moderate. The Buchanan soils are deep and moderately well drained. A compact layer in the lower part of the subsoil restricts internal drainage. The Andover soils are deep, are poorly drained, and have a slowly permeable fragipan at a depth between 14 and 30 inches.

In about 85 percent of this association, the soils are very stony and forested. Except for a few areas of Andover soils in hay or pasture, the rest of the association has been cleared and is used for general farming.

4. Berks-Bedington-Weikert Association

Deep to shallow, well-drained, nearly level to steep soils that have a shaly silt loam to shaly silty clay loam subsoil; on uplands

Most of this association occurs in a strip about 6 miles wide that extends from north and south of

Figure 2.—**Typical landscape in soil association 2. Calvin and Leck Kill soils are in foreground, and Dekalb and Lehew soils of association 1 on wooded ridge in background.**

Harrisburg to the Lebanon County line. A small area is in the northwestern part of the county. The soils developed in material weathered from gray shale and sandstone. The landscape is gently sloping to steep. In most places the soils have been cleared and are used for general farm crops.

This association makes up about 15 percent of the county. About 55 percent of the association is Berks soils, 10 percent is Bedington soils, 7 percent is Weikert soils, and 28 percent is minor soils.

The Berks soils are gently sloping to sloping, moderately deep, and well drained. They have moderate available moisture capacity. The Bedington soils are nearly level to gently sloping, deep, and well drained. They also have moderate available moisture capacity. The Weikert soils are steep in most places and are shallow, are well drained, and have low available moisture capacity.

Among the minor soils in this association are the poorly drained Brinkerton soils, the moderately well drained Comly soils, and the Philo and Atkins soils of the flood plains.

The major soils in this association are used mostly for general farming and for dairy and livestock enterprises. The Weikert soils, however, are used for pasture and trees.

5. Hagerstown-Duffield Association

Deep, well-drained, nearly level to gently sloping soils that have a silty clay loam to clay subsoil; on uplands

This association extends across the county from

Figure 3.—**Typical landscape in soil association 5. Hagerstown silt loams are in foreground. On ridge in background are Lewisberry gravelly sandy loams in soil association 6.**

Hershey and vicinity westward toward the Susquehanna River. West of Hummelstown the association is divided into two separate strips by soil association 4. The northern strip, called the Steelton belt, follows the Reading Railroad almost to Harrisburg. The southern strip, called the Hummelstown belt, joins soil association 8 near the Susquehanna River.

The soils in association 5 formed from weathered limestone. In several areas, the limestone is exposed and cultivation is difficult. The topography is undulating and has numerous concave depressions. The soils in this association are nearly level to sloping, but in some places they are adjacent to steeper soils in soil association 6 (fig. 3).

This association makes up about 4 percent of the county. About 68 percent of the association is Hagerstown soils, 5 percent is Duffield soils, and 27 percent is minor soils.

The major soils in this association are moderately permeable and have high available moisture capacity. The yellowish-brown Duffield soils have less clay in the subsoil than the reddish Hagerstown soils.

Among the minor soils in this association are the well drained Tioga soils, the moderately well drained Lindside soils, and the well drained Huntington soils.

Major soils in this association are suited to most general farm crops and to truck crops and orchard trees. Crops grow well on these soils.

6. Lewisberry-Penn-Athol Association

Deep and moderately deep, well-drained, gently sloping

and sloping soils that have a dominantly gravelly sandy clay loam to shaly silty clay loam subsoil; on uplands

This association is in the southern part of Dauphin County. In most places the soils in this association are gently sloping and sloping, but south of Hershey and Hummelstown a large wooded area is rough, stony, hilly, and steep. The soils in this association formed in material weathered from red sandstone and shale.

This association makes up about 4 percent of the county. About 40 percent of the association is Lewisberry soils, 40 percent is Penn soils, 6 percent is Athol soils, and 14 percent is minor soils.

The major soils in this association are well drained. The Lewisberry soils are deep and have a sandy surface layer and a reddish-brown subsoil in which clay has accumulated. Available moisture capacity is moderate. The Penn soils also have moderate available moisture capacity. They are moderately deep shaly silt loams in which clay has accumulated in the subsoil. The Athol soils also have an accumulation of clay in the subsoil. Available moisture capacity is moderate to high.

Among the minor soils in this association are the moderately well drained Readington soils, the poorly drained Croton soils, and the Philo soils of the flood plains.

In most of this association the soils have been cleared and are used for general farm crops. Crops grow moderately well on these soils.

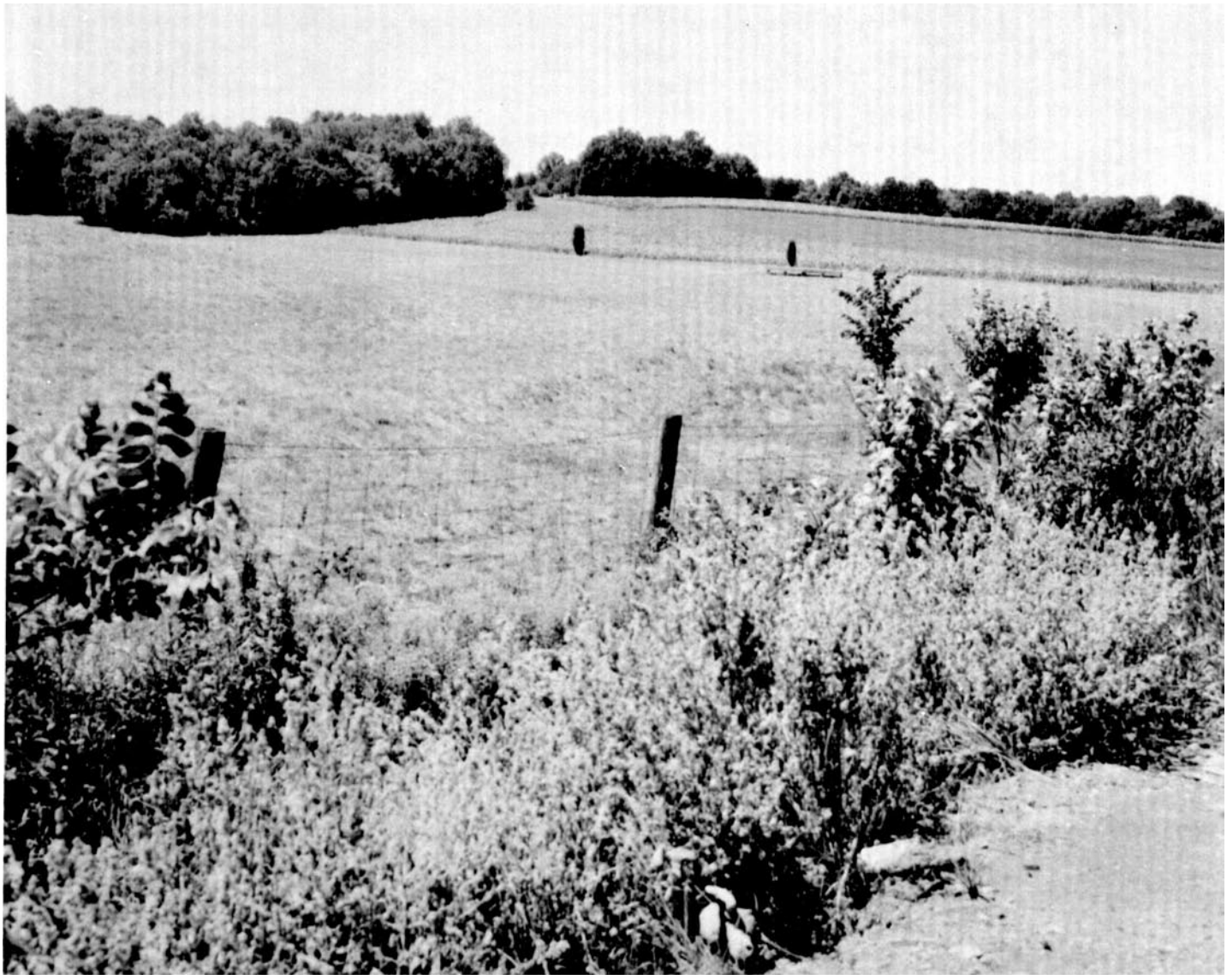


Figure 4.—Typical landscape of soil association 7. Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded, in foreground; and Neshaminy gravelly silt loam, 3 to 12 percent slopes, moderately eroded, on ridges and in wooded area in background.

7. Brecknock-Neshaminy Association

Deep, well-drained, gently sloping and sloping soils that have a clay loam and silty clay loam subsoil; on uplands

This association is in the southern part of Dauphin County and is surrounded by the Lewisberry-Penn-Athol association. The Brecknock-Neshaminy association is on ridges and higher elevations associated with intrusive diabase dikes that have penetrated red sandstone and shale. The Brecknock soils formed in materials weathered from metamorphosed red sandstone and shale. The Neshaminy soils formed in material weathered from diabase. The Brecknock soils are in narrow, intermittent bands that border the Neshaminy soils (fig. 4).

This association makes up about 3 percent of the county. About 50 percent of the association is the Brecknock soils, 25 percent is Neshaminy soils, and 25 percent is Watchung, Lehigh, and other minor soils.

The major soils in this association are deep, are well drained, and have moderate available moisture capacity. The dark grayish-brown Brecknock soils are slaty. The Neshaminy soils have a strong-brown and yellowish-red subsoil and numerous large stones on the surface.

Most areas of the Brecknock soils have been cleared and are used for general farming. Most areas of the Neshaminy soils are still wooded, but a few areas have been cleared and are used for grain, hay, or pasture.

8. Duncannon-Chavies-Tioga Association

Deep, well-drained, nearly level and gently sloping soils that have a fine sandy loam to silt loam subsoil; on terraces and flood plains mostly along the Susquehanna River

This association consists of well-drained soils that lie mostly along the Susquehanna River, but some areas are on islands in the river. These soils developed in alluvial deposits of sand, silt, and clay that are underlain by gravel and sand. They have moderate to moderately rapid permeability and moderate to high available moisture capacity.

This association makes up about 3 percent of the county. About 25 percent of the association is Duncannon soils, 20 percent is Chavies soils, 20 percent is Tioga soils, and the rest is Riverwash, other land types, and minor soils.

The Duncannon soils have a very fine sandy loam surface layer and a very fine sandy loam and silt loam subsoil. The Chavies soils have a fine sandy loam surface layer and a fine sandy loam and sandy loam subsoil. The Tioga soils have a fine sandy loam and loam surface layer and subsoil. Tioga soils are subject to flooding. The Duncannon and Chavies soils are on higher terraces above the soils of the flood plains.

Nearly all areas of the major soils in this association are used for general farm crops or urban developments.

Use and Management of the Soils

The soils of Dauphin County are used for cultivated crops and pasture, and they also are used extensively for community development. This section explains how the soils may be managed for these main purposes. It also gives information on use of soils as commercial woodland and for community plantings, for habitats for wildlife, and for building highways, dams, and similar engineering structures.

Use of Soils for Crops and Pasture

In the following pages the capability classification used by the Soil Conservation Service is explained; the capability units in which soils are grouped according to their suitability for crops are described; and productivity ratings are given for specified crops under two levels of management.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for recreation, for forest trees, or for engineering.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artifical drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w, s,* and *c,* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodand, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar prodcutivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

In the following pages the capability units in Dauphin County are described and suggestions for the use and management of the soils are given. The soil series represented in each capability unit are mentioned in describing the unit. This does not mean, however, that all the soils in a series are in the capability unit. The names of all the soils in a unit are in the "Guide to Mapping Units" at the back of this survey.

Management by capability units

All soils in one capability unit have about the same limitations and similar risks of damage. The soils in one unit, therefore, need about the same kind of management, though they may have formed from different kinds of parent material and in different ways.

Suitable cropping systems are described for each capability unit in terms of high, medium, low, and very low intensity.

1. A high-intensity rotation is defined as a 4-year rotation that consists of 1 year of a row crop followed by a cover crop, another row crop followed by small grain, and 1 year of hay or pasture.
2. A medium-intensity rotation is defined as a 3-year rotation that consists of 1 year each of a row crop, small grain, and hay.
3. A low-intensity rotation is defined as a 4- or 5-year rotation that consists of 1 year of a row crop, 1 year of a small grain, and 2 or 3 years of hay.
4. A very low intensity rotation is defined as a rotation of 5 or more years that consists of 1 year of a row crop, 1 year of a small grain, and 3 or more years of hay.

Rotations may be changed to meet special needs of the farmer or to take into account the specific management practices used for reducing erosion. Such management practices include contour stripcropping, terracing, and sodding of waterways.

To reduce erosion by removing excess surface water, wet soils generally need graded strips in nearly level areas and terraces and grassed waterways in steep areas. Excess subsurface water may be removed by tile drainage or open ditch systems where these soils are nearly level or gently sloping and outlets are available.

Management practices that help to increase the organic-matter content include the use of cover crops, stubble mulch, green manure, and barnyard manure where available. Also, lime and fertilizer should be added in the amounts and at the intervals indicated by soil tests.

Additional help in managing the soils can be obtained by consulting the local representative of the Soil Conservation Service, the county agricultural agent, or a member of the staff of the State Agricultural Experiment Station.

CAPABILITY UNIT I-1

In this capability unit are deep, nearly level, well-drained Bedington, Duncannon, Hagerstown, and Huntington soils. These soils have moderate permability, have moderate to high available moisture capacity, and are strongly acid to neutral. They are easily worked, and crops on them respond well to applications of fertilizer and lime. The erosion hazard is slight.

The soils in this unit are suited to all farm crops grown in the county. Because the erosion hazard is only slight, these soils can be protected by using a rotation of high intensity. A cover crop helps to maintain the organic-matter content.

CAPABILITY UNIT IIe-1

This unit consists of gently sloping, deep, well-drained, medium-textured soils that formed in place from material weathered from limestone or from material high in bases. These soils are in the Athol, Bedington, Duffield, Hagerstown, and Neshaminy series. They have moderate permeability, have moderate to high available moisture capacity, and are strongly acid to neutral. The hazard of erosion is moderate.

The soils in this unit are suited to most crops grown in the county. A rotation of medium intensity, sup-

ported by other management, helps to reduce erosion by retarding runoff.

CAPABILITY UNIT IIe-2

This unit consists of deep, gently sloping, well-drained soils in the Chavies and Duncannon series. These soils formed in sandy and silty materials on terraces above the flood plains. They have moderate to moderately rapid permeability, have moderate to high available moisture capacity, and are strongly acid to slightly acid.

The soils in this unit are suited to the general farm crops grown in the county. A rotation of medium intensity, supported by other suitable management, helps to reduce erosion by retarding runoff.

CAPABILITY UNIT IIe-3

Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this capability unit. This soil is deep and well drained. It formed at the base of steep slopes in material weathered from red or gray sandstone and shale. It has moderately slow permeability, has moderate available moisture capacity, and is strongly acid.

This soil is suited to the general farm crops grown in the county. A rotation of medium intensity, supported by other suitable management, helps to reduce erosion and to increase organic-matter content.

CAPABILITY UNIT IIe-4

This capability unit consists of deep and moderately deep, gently sloping, well-drained soils. These soils formed in place from material weathered from acid shale and sandstone. They have moderate to moderately rapid permeability, have moderate to low available moisture capacity, and are slightly acid to strongly acid. They are in the Berks, Brecknock, Calvin, Leck Kill, Dekalb, and Penn series. On the soils in this unit the hazard of erosion is moderate.

These soils are suited to general farm crops, but suitable management is needed for good growth of plants. A rotation of medium intensity helps to reduce erosion and to maintain the organic-matter content.

CAPABILITY UNIT IIe-5

In this capability unit are deep, gently sloping, moderately well drained soils of the Albrights, Buchanan, Lawrenceville, Captina, Readington, and Comly series. The Albrights, Buchanan, Comly, and Readington soils formed in place from material weathered from shale and sandstone, and the Lawrenceville and Captina soils formed in silty and sandy deposits. The root zone is shallow because these soils have a compact layer in the subsoil that restricts the movement of water and air. Permeability is slow to moderately slow, and available moisture capacity is low to moderate. These soils are very strongly acid to slightly acid. Surface runoff is medium, and the hazard of erosion is moderate.

Except for deep-rooted plants that require a well-drained soil, the soils in this unit are suited to general farm crops. A rotation of medium intensity helps to maintain crop growth and to control runoff. Artificial drainage is needed to remove excess water.

CAPABILITY UNIT IIw-1

This capability unit consists of deep, nearly level, moderately well drained to well drained soils that occur along streams. Flooding is likely and, in some places, these soils are damaged by scouring and gouging or by channel cutting. Because surface runoff is slow, erosion is only a slight hazard. Permeability is moderately slow to moderate, and available moisture capacity is moderate to high. These soils are slightly acid to strongly acid. They are in the Barbour, Basher, Lindside, and Philo series.

Except for deep-rooted plants that require a well-drained soil, the soils in this unit are well suited to the general farm crops grown in the county. A rotation of medium intensity helps to maintain crop growth. Cover crops are needed in winter, and artificial drainage is needed to remove excess water.

CAPABILITY UNIT IIw-2

Albrights silt loam, 0 to 3 percent slopes, is the only soil in this capability unit. This soil is deep and moderately well drained. It formed in place from material weathered from red shale and sandstone. It has moderately slow permeability because of a compact layer in the subsoil. Available moisture capacity is moderate.

Except for deep-rooted plants that require a well-drained soil, the soil in this unit is suited to general farm crops. A rotation of medium intensity helps to maintain the organic-matter content. Cover crops are needed in winter, and artificial drainage generally is needed to remove excess water.

CAPABILITY UNIT IIs-1

This capability unit consists of deep, nearly level, well-drained soils of the Chavies and Tioga series. These soils formed in recent alluvium washed from soils that were derived from shale, sandstone, and limestone. They have moderate to moderately rapid permeability, have moderate available moisture capacity, and are slightly acid to strongly acid.

The soils in this unit are suited to the general farm crops grown in the county. A rotation of medium intensity that includes cover crops in winter is needed to help maintain organic-matter content and to sustain growth of crops. These soils respond well to treatment.

CAPABILITY UNIT IIs-2

Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this capability unit. This deep, well-drained soil formed in place from material weathered from acid, red sandstone and conglomerate. It has moderate available moisture capacity, has moderately rapid permeability, and is medium acid.

If lime is added, this soil is suited to the general farm crops grown in the county, though late in summer adequate moisture may not be available for crop use. A rotation of medium intensity helps to maintain the organic-matter content and to increase the capacity of this soil to hold moisture.

CAPABILITY UNIT IIIe-1

This capability unit consists of deep, sloping, well-drained soils in the Hagerstown and Bedington series.

These soils formed in place from material weathered from limestone or calcareous shale. They have moderate permeability, have moderate to high available moisture capacity, and are neutral to strongly acid.

The soils in this unit are suited to most farm crops grown in the county. A rotation of low intensity helps to control erosion and to maintain the organic-matter content. Other management is needed to slow runoff and control erosion.

CAPABILITY UNIT IIIe-2

Laidig gravelly loam, 8 to 20 percent slopes, moderately eroded, is the only soil in this capability unit. This deep, well-drained soil formed in colluvial material that washed from acid sandstone and shale. It has moderately slow permeability and moderate available moisture capacity. In most places a few coarse fragments are on the surface and in the profile.

This soil is suited to most farm crops grown in the county if a rotation of low intensity is used and is supported by other suitable management that helps to control erosion.

CAPABILITY UNIT IIIe-3

This capability unit consists of moderately deep and deep, sloping, well-drained soils. These moderately eroded soils are in the Berks, Brecknock, Calvin, Leck Kill, and Penn series. They have moderate to moderately rapid permeability, have moderate to low available moisture capacity, and are slightly acid to strongly acid if lime is not added.

The soils in this unit are used for most farm crops grown in the county, but grain crops that mature late in summer or early in fall generally are damaged by lack of moisture or by actual drought. A low intensity rotation is needed to retard runoff and conserve moisture. Other suitable management also helps to control erosion and maintain crop growth.

CAPABILITY UNIT IIIe-4

This capability unit consists of deep, sloping, well-drained sandy loams of the Chavies and Lewisberry series. These soils are underlain by sandstone conglomerate and by sand, gravel, and other materials from old terraces. They have moderately rapid permeability, have moderate available moisture capacity, and are strongly acid to medium acid if lime is not added.

The soils in this unit are suited to most farm crops, but small grain crops that mature late in summer or early in fall frequently are damaged by lack of available moisture. A rotation of low intensity helps to maintain fertility, and other suitable management is needed to increase available moisture and reduce erosion.

CAPABILITY UNIT IIIe-5

Dekalb channery sandy loam, 8 to 15 percent slopes, moderately eroded, is the only soil in this capability unit. This moderately deep, well-drained soil formed in place from material weathered from sandstone and shale. It has moderately rapid permeability, has low available moisture capacity, and is very strongly acid.

Because available moisture capacity is low, this soil is only fairly well suited to most farm crops. A rotation of low intensity helps to maintain the organic-matter content, slow runoff, control erosion, and maintain the growth of crops.

CAPABILITY UNIT IIIe-6

Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this capability unit. This soil is shallow to bedrock and well drained. It formed in place from material weathered from red shale and sandstone. It has moderately rapid permeability, has low available moisture capacity, and is medium acid to strongly acid. Erosion is a moderate hazard.

The use of this soil for general farm crops is limited by the shallow rooting zone. Crop growth is poor. A rotation of low intensity is needed to help control runoff and erosion. Cover crops help to maintain organic-matter content.

CAPABILITY UNIT IIIw-1

Atkins silt loam is the only soil in this capability unit. This deep, poorly drained soil formed in alluvial deposits washed from soils derived from shale and sandstone. It has moderate permeability, has moderate available moisture capacity, and is strongly acid and very strongly acid. The water table is high.

Except for deep-rooted plants that are not water tolerant, this soil is suited to most farm crops. A rotation of low intensity that includes a winter cover crop is needed to prevent damage from flooding and to maintain organic-matter content. A suitable artificial drainage system helps to remove excess water and increases growth of crops.

CAPABILITY UNIT IIIw-2

Lehigh silt loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this capability unit. This soil is deep and moderately well drained. It formed in place from material weathered from dark-gray, acid, metamorphosed shale and sandstone. This soil has slow permeability and moderate available moisture capacity. It is strongly acid if lime is not added. Erosion is a moderate hazard.

This soil is suited to crops that are tolerant of excess water for fairly long periods. Small grains and other shallow-rooted plants grow fairly well. A rotation of low intensity is needed to help control runoff and reduce erosion. Also needed are drainage practices that help to remove excess water and increase crop growth.

CAPABILITY UNIT IVe-1

This capability unit consists of moderately deep and shallow, sloping to moderately steep, well-drained soils in the Berks, Calvin, and Klinesville series. These soils formed in place from material weathered from shale and sandstone. The hazard of erosion is severe. Permeability is moderate to moderately rapid, and available moisture capacity is moderate to low.

The soils in this unit have severe limitations for growth of cultivated crops because slopes are moderately steep and bedrock is near the surface.

CAPABILITY UNIT IVe-2

This unit consists of shallow, gently sloping to moderately steep, well-drained soils in the Klinesville and Weikert series. These soils formed in material weathered from shale and sandstone. They have moderately rapid permeability, have low available moisture capacity, and are strongly acid if lime is not added. The hazard of erosion is severe.

The soils in this unit generally are not used for cultivated crops but are used for hay or pasture. They occasionally may be cultivated, however, before reseeding the pasture. Management practices are needed that retard runoff and allow rainfall to soak into the soils for plant use.

CAPABILITY UNIT IVe-3

Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded, is the only soil in this capability unit. This deep, well-drained soil formed in material weathered from reddish-colored sandstone conglomerate stratified with shale. It has moderately rapid permeability and moderate available moisture capacity.

This soil occasionally may be used for a cultivated crop but, most of the time it should remain under a permanent cover. A rotation of very low intensity, supported by other management that retards runoff, is needed to reduce erosion and maintain growth of crops.

CAPABILITY UNIT IVw-1

This unit consists of deep and moderately deep, nearly level and gently sloping, poorly drained soils on uplands or lower side slopes. These soils are in the Andover, Armagh, Brinkerton, and Croton series. They have slow permeability, have moderate to high available moisture capacity, and are strongly acid if lime is not added. The hazard of erosion is slight to moderate.

Because the water table is high for a prolonged period, the soils in this unit generally are not well suited to cultivated crops. Plants that tolerate a wet soil for longer periods grow better than other plants. A rotation of very low intensity is well suited to the soils in this unit. A suitable artificial drainage system should be used where needed and feasible.

CAPABILITY UNIT Vw-1

Watchung silt loam is the only soil in this capability unit. This soil is deep, nearly level, and poorly drained. It formed in material derived mostly from diabase rock. Some areas have received colluvial deposits from slopes above. Watchung silt loam has slow permeability, has moderate available moisture capacity, and is slightly acid and medium acid.

This soil is fairly well suited to pasture and trees or to plants that provide food and cover for wildlife. Water-tolerant grasses, legumes, and shrubs grow well on this soil. Drainage practices should be used where feasible.

CAPABILITY UNIT VIe-1

This capability unit consists of shallow to moderately deep, moderately steep, shaly soils that are well drained. These soils are in the Calvin, Klinesville, and Weikert series. They formed from material weathered from shale and sandstone. The have moderate to moderately rapid permeability, have moderate to low available moisture capacity, and are medium acid to very strongly acid if lime is not added. Erosion is a moderate hazard.

The soils in this unit are too steep and shallow for use as cropland, but they are suited to pasture or trees. Where used for pasture, good management helps to maintain growth of plants.

CAPABILITY UNIT VIs-1

This capability unit consists of moderately deep to deep, well drained and moderately well drained soils that are nearly level to moderately steep. These soils developed in material weathered from shale, sandstone, and diabase. They are in the Buchanan, Calvin, Dekalb, Laidig, Lehew, Lewisberry, and Neshaminy series. They have moderately rapid to slow permeability, have low to moderate available moisture capacity, and are medium acid to very strongly acid. Erosion is a slight to moderate hazard.

The soils in this unit are too stony for use as cropland, but under good management they are well suited as woodland and wildlife habitat. In areas cleared of stones and trees, these soils can be used for pasture to a limited extent.

CAPABILITY UNIT VIIe-1

This capability unit consists of shallow, steep, well-drained, shaly soils on uplands. These soils are in the Klinesville and Weikert series. They formed in material weathered from shale and sandstone. Because runoff is rapid, the hazard of erosion is moderate to severe. Permeability is moderately rapid, and available moisture capacity is low. These soils are strongly acid to very strongly acid if lime is not added.

The soils in this unit are too steep and shallow for use as cropland but are suitable as woodland and for wildlife. Even under good management, use for pasture is limited. Where trees are grown for timber, cover should be maintained to encourage reseeding of desirable species.

CAPABILITY UNIT VIIw-1

Muck is the only soil in this capability unit. This organic soil is deep and poorly drained and is wet throughout the year. It is suitable for wildlife and for limited use as woodland.

CAPABILITY UNIT VIIw-2

Only Riverwash is in this unit. It is deep, well drained to poorly drained, and alluvial. In most places, culm, or coal screenings, has been deposited in a layer 1 to 5 inches thick along the streams by floodwaters. These areas are not suitable as cropland or for pasture, and use as woodland is limited. The streams most affected by the deposits are Wiconisco Creek, Swatara Creek, and the Susquehanna River; and especially affected are the islands in the river.

CAPABILITY UNIT VIIs-1

This unit consists of moderately deep and deep, steep

TABLE 1.—*Estimated productivity rating for arable soils*

[In columns A are productivity ratings for soils under ordinary management, and in columns B are productivity rating for improved

Soil	Corn				Oats	
	Grain (100=80 bu. per acre)		Silage (100=16 tons per acre)		(100=45 bu. per acre)	
	A	B	A	B	A	B
Albrights silt loam, 0 to 3 percent slopes	65	125	65	125	60	120
Albrights silt loam, 3 to 10 percent slopes, moderately eroded	65	125	65	125	65	120
Andover gravelly loam, 3 to 8 percent slopes	.....	85	.....	85	.....	100
Athol silt loam, 3 to 8 percent slopes, moderately eroded	95	160	95	160	90	150
Atkins silt loam	.....	110	.....	110	.....	115
Barbour silt loam	95	160	95	160	95	155
Basher silt loam	90	145	90	145	85	140
Bedington shaly silt loam, 0 to 3 percent slopes	80	160	80	160	80	150
Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded	80	160	80	160	75	145
Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded	75	140	75	140	70	135
Berks channery silt loam, 3 to 8 percent slopes, moderately eroded	45	90	45	90	60	110
Berks channery silt loam, 8 to 15 percent slopes, moderately eroded	40	85	40	85	50	100
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded	55	100	55	100	70	110
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded	45	95	45	95	60	100
Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded	40	90	40	90	55	95
Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded	65	115	65	115	55	105
Brecknock channery silt loam, 8 to 20 percent slopes, moderately eroded	60	110	60	110	55	100
Brinkerton and Armagh silt loams, 0 to 3 percent slopes	.....	70	.....	70	.....	90
Brinkerton and Armagh silt loams, 3 to 8 percent slopes, moderately eroded	.....	75	.....	75	.....	100
Buchanan gravelly loam, 3 to 8 percent slopes	75	130	75	130	70	125
Buchanan very stony loam, 0 to 8 percent slopes	.....	.....	.....	.....	.....	.....
Calvin very stony silt loam, 0 to 8 percent slopes	.....	.....	.....	.....	.....	.....
Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded	35	80	35	80	45	85
Calvin-Klinesville shaly silt loams, 15 to 25 percent slopes, moderately eroded	30	70	30	70	40	75
Calvin-Leck Kill shaly silt loams, 0 to 3 percent slopes	65	120	65	120	65	110
Calvin-Leck Kill shaly silt loams, 3 to 8 percent slopes, moderately eroded	60	115	60	115	60	105
Calvin-Leck Kill shaly silt loams, 8 to 15 percent slopes, moderately eroded	55	105	55	105	55	100
Captina silt loam, 3 to 8 percent slopes, moderately eroded	65	120	65	120	70	130
Chavies fine sandy loam, 0 to 3 percent slopes	80	135	80	135	75	145
Chavies fine sandy loam, 3 to 8 percent slopes, moderately eroded	70	130	70	130	70	140
Chavies fine sandy loam, 8 to 15 percent slopes, moderately eroded	65	125	65	125	70	135
Comly silt loam, 2 to 8 percent slopes, moderately eroded	60	120	60	120	65	125
Croton silt loam	.....	80	.....	80	.....	100
Dekalb channery sandy loam, 3 to 8 percent slopes, moderately eroded	45	85	45	85	60	100
Dekalb channery sandy loam, 8 to 15 percent slopes, moderately eroded	40	80	40	80	50	95
Dekalb and Lehew very stony sandy loams, 0 to 8 percent slopes	.....	.....	.....	.....	.....	.....
Duffield silt loam, 3 to 8 percent slopes, modreately eroded	95	160	95	160	95	165
Duncannon very fine sandy loam, 0 to 3 percent slopes	80	155	80	155	80	150
Duncannon very fine sandy loam, 3 to 8 percent slopes, moderately eroded	95	150	95	150	75	145
Hagerstown silt loam, 0 to 3 percent slopes	100	165	100	165	100	170
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	95	160	95	160	95	165
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	90	150	90	150	90	155
Huntington silt loam, local alluvium	100	165	100	165	95	155
Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded	35	80	35	80	40	85
Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded	.....	.....	.....	.....	35	80
Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded	.....	.....	.....	.....	.....	.....
Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded	80	150	80	150	75	145
Laidig gravelly loam, 8 to 20 percent slopes, moderately eroded	75	145	75	145	70	140
Laidig very stony loam, 0 to 8 percent slopes	.....	.....	.....	.....	.....	.....
Laidig very stony loam, 8 to 25 percent slopes	.....	.....	.....	.....	.....	.....
Lawrenceville very fine sandy loam, 2 to 8 percent slopes, moderately eroded	75	145	75	145	70	110
Lehigh silt loam, 3 to 8 percent slopes, moderately eroded	55	95	55	95	55	105
Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded	70	130	70	130	70	120
Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded	65	120	65	120	70	120
Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	55	95	55	95	60	115
Lewisberry very stony sandy loam, 5 to 25 percent slopes	.....	.....	.....	.....	.....	.....
Lindside silt loam	90	145	90	145	85	140
Lindside silt loam, coal overwash	80	135	80	135	70	125
Neshaminy gravelly silt loam, 3 to 12 percent slopes, moderately eroded	80	150	80	150	75	140
Neshaminy very stony silt loam, 0 to 8 percent slopes	.....	.....	.....	.....	.....	.....
Neshaminy very stony silt loam, 8 to 25 percent slopes	.....	.....	.....	.....	.....	.....

for specified crops at two levels of management

management. Absence of data indicates that the soil is not suited to the specified crop at the specified level of management]

Wheat		Barley		Potatoes		Hay				Pasture			
(100=35 bu. per acre)		(100=50 bu. per acre)		(100=325 bu. per acre)		Alfalfa-grass mixture (100=3 tons per acre)		Grass-legume (100=2 tons per acre)		Blue grass (100=100 cow-acre-days [1])		Tall grass (100=100 cow-acre-days [1])	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
50	95	50	100	75	145	45	90	85	150	65	140	80	170
50	100	55	100	80	160	50	100	85	155	65	150	80	175
.....	75	.....	80	.....	.....	.....	.....	55	110	45	95	60	125
75	125	75	125	95	180	85	150	100	170	80	150	125	250
.....	95	.....	90	.....	.....	.....	.....	100	150	80	140	100	170
90	145	90	145	100	185	100	150	100	200	80	150	150	255
75	115	70	120	90	155	80	125	100	180	80	150	120	215
75	125	80	130	100	185	75	150	90	165	75	150	110	255
70	110	75	125	95	180	75	150	85	160	70	150	110	255
70	105	70	120	90	170	70	140	80	150	65	140	105	250
50	75	55	100	.....	.....	35	105	55	125	45	110	50	175
45	75	50	90	.....	.....	30	100	50	120	40	105	45	170
60	80	60	100	55	135	50	110	60	135	50	125	75	180
55	75	55	95	45	130	45	105	55	130	45	115	65	175
50	70	50	90	.....	.....	35	100	50	125	40	110	50	170
50	95	50	95	60	145	70	120	70	140	55	130	105	205
45	90	45	90	55	135	65	115	70	135	55	125	95	195
.....	65	.....	70	.....	.....	.....	.....	80	110	60	95	80	125
.....	70	.....	75	.....	.....	.....	.....	90	130	70	115	90	140
55	105	65	115	80	150	55	100	90	160	70	150	90	180
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	110	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	60	.....	.....
35	70	35	90	.....	.....	30	85	50	105	40	90	50	140
30	60	30	65	.....	.....	25	70	50	95	40	90	50	115
50	95	55	100	60	140	65	115	75	140	60	130	95	195
50	90	50	95	55	135	60	115	70	140	55	130	90	195
45	90	45	90	50	130	55	110	70	135	55	125	80	190
75	100	70	115	80	145	45	90	85	140	70	130	70	155
65	120	60	125	95	135	70	135	80	155	65	150	100	230
60	115	60	115	95	135	70	135	80	150	65	140	100	230
55	110	60	110	85	120	60	120	75	140	60	130	90	205
55	95	55	100	75	145	50	95	80	155	65	150	80	175
.....	80	.....	80	.....	.....	.....	.....	60	110	50	95	60	125
50	80	50	80	.....	.....	35	80	60	105	50	90	60	135
45	60	45	75	.....	.....	30	75	50	100	40	85	50	125
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40	75	.....	.....
90	120	90	125	100	190	100	150	100	170	80	150	150	255
80	125	70	130	100	195	75	145	90	165	70	150	110	245
75	120	65	125	95	190	75	140	85	160	70	150	110	240
100	125	100	130	100	190	100	150	100	170	80	150	150	255
90	120	90	125	100	190	100	150	100	170	80	150	150	255
85	115	85	120	95	180	95	145	95	165	75	150	140	245
100	130	100	130	100	195	100	150	100	165	80	150	150	255
35	70	35	90	.....	.....	30	60	50	90	40	80	50	100
30	65	30	85	.....	.....	30	60	45	90	35	80	45	100
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	70	.....	.....
75	115	75	130	95	180	75	140	85	160	70	150	110	240
70	110	70	120	90	175	70	135	85	155	70	150	105	230
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	55	110	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	100	.....	.....
65	95	65	100	90	160	70	110	85	155	70	150	105	190
45	85	45	85	.....	.....	50	100	75	140	60	130	75	170
80	110	70	120	95	180	75	140	75	155	60	150	110	240
70	105	65	115	90	175	75	140	75	150	60	140	105	240
65	90	60	105	.....	.....	70	130	70	145	55	130	105	220
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	100	.....	.....
80	110	70	110	90	165	80	125	100	180	80	150	120	215
60	90	60	90	.....	.....	75	115	90	170	70	150	110	195
80	115	80	125	90	180	75	145	100	160	80	150	110	245
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50	110	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	100	.....	.....

TABLE 1.—*Estimated productivity ratings for arable soils for*

Soil	Corn				Oats	
	Grain (100=80 bu. per acre)		Silage (100=16 tons per acre)		(100=45 bu. per acre)	
	A	B	A	B	A	B
Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded	60	115	60	115	55	100
Penn shaly silt loam, 8 to 15 percent slopes, moderately eroded	55	105	55	105	50	95
Philo silt loam	90	145	90	145	85	140
Readington silt loam, 3 to 8 percent slopes, moderately eroded	65	125	65	125	65	120
Tioga fine sandy loam	95	160	95	160	95	150
Tioga fine sandy loam, high bottom	80	135	80	135	75	145
Watchung silt loam						
Weikert shaly silt loam, 5 to 15 percent slopes, moderately eroded					35	80
Weikert shaly silt loam, 15 to 25 percent slopes, moderately eroded						

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An animal unit is 1 cow,

to very steep, very stony soils that are well drained. These soils are in the Calvin, Dekalb, Lehew, and Lewisberry series. They formed in material weathered from shale and sandstone. Permeability is moderate to moderately rapid, and available moisture capacity is low to moderate. Erosion is a slight hazard.

These soils are too steep and stony for use as cropland or pasture. They are fairly well suited to trees and to plants that provide food and cover for wildlife.

CAPABILITY UNIT VIIs-2

This unit consists of deep, nearly level to gently sloping, very stony soils that are poorly drained. These soils are in the Andover and Watchung series. The Andover soil formed in material weathered from sandstone, and the Watchung soil formed in material weathered from diabase. The soils in this unit have slow permeability, have moderate available moisture capacity, and are strongly acid to medium acid if lime is not added. Erosion is a slight hazard.

The soils of this unit are too stony and wet for general farm crops. If stones are removed, these soils can be used for limited grazing. They generally are suited as woodland and to plants that furnish food and cover for wildlife.

CAPABILITY UNIT VIIIs-1

This capability unit consists of Very stony land, sloping, and Very stony land, steep. Areas are too steep and stony for cultivated crops, hay, pasture plants, or trees of commercial value. Most areas are suitable, however, as sites for watersheds or for recreation, though some areas are too stony for recreation.

Productivity ratings

Table 1 shows, by relative numbers, estimated productivity ratings of the arable soils of Dauphin County for specified crops. These estimates are average for a period of 10 years or more. Each rating of relative productivity denotes the comparative yields of the soil for the specified crop in relation to a standard index of 100. The standard index represents the average yield per acre obtained on the more productive soils in the county. The average acre yield represented by the standard index is given at the head of the column for each crop. The average acre yields are based on yields of crops during the favorable growing seasons in the period when the soils were surveyed.

The productivity ratings are given for two levels of management. In columns A are the ratings to be expected under the average management commonly used on most farms in the county. In columns B are ratings that indicate yields that may be obtained in average growing seasons if improved management is practiced. The yields in columns B are not intended to indicate maximum yields obtainable. They vary for the different soils but generally are higher than the present yields in the county.

Improved management consists of planting adapted varieties of crops, applying fertilizer and lime in the amounts indicated by soil tests; using suitable practices to control weeds, insects, and diseases; and using practices that help to control erosion and that safely remove excess surface water and excess internal water. The practices that help to control erosion include minimum tillage, contour tillage, stripcropping, suitable management of crop residue, and use of adequate drainageways, waterways, and diversions. Other suitable practices may be obtained from the Soil Conservation Service and Agricultural Extension Service in this county. Irrigation is not considered in estimating the yields.

An index of 50 indicates that the soil is only about half as productive for the specified crop as a soil that has a standard index of 100. By fertilizing heavily,

specified crops at two levels of management—Continued

Wheat		Barley		Potatoes		Hay				Pasture			
(100=35 bu. per acre)		(100=50 bu. per acre)		(100=325 bu. per acre)		Alfalfa-grass mixture (100=3 tons per acre)		Grass-legume (100=2 tons per acre)		Blue grass (100=100 cow-acre-days [1])		Tall grass (100=100 cow-acre-days [1])	
A	B	A	B	A	B	A	B	A	B	A	B	A	B
50	90	50	90	55	135	60	115	70	140	55	130	90	195
45	90	45	85	50	130	55	110	70	135	55	125	80	190
70	115	70	120	90	155	80	125	100	180	80	150	120	215
50	100	55	100	80	160	50	100	85	155	65	150	80	175
95	125	90	125	100	195	90	145	100	160	80	150	135	245
65	120	60	125	95	135	70	135	80	155	65	150	100	230
.....	.....	.....	.....	.....	.....	.....	.....	50	75	40	70	.....	.....
30	65	30	85	.....	.....	30	60	45	90	35	80	45	100
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30	70	.....	.....

steer, horse, or mule; 5 hogs; or 7 sheep. An acre of pasture that provides 30 days of grazing for 2 cows, for example, has a carrying capacity of 60 cow-acre-days.

or by using other intensive management, an index of more than 100 can be obtained for some soils.

For example, Hagerstown silt loam, 0 to 3 percent slopes, has an A column rating of 100 for most crops listed. Consequently, under the prevailing level of management (columns A), the farmer can expect to obtain average yields of 80 bushels of corn for grain, 45 bushels of oats, 35 bushels of wheat, and 3 tons of an alfalfa-grass mixture.

Under improved management (columns B), the same soil has an estimated productivity rating of 165 for corn grown for grain. By multiplying 165 by 80 (head of column for corn) and dividing the product by 100, we get 132. This means that yields per acre on Hagerstown silt loam, 0 to 3 percent slopes, can equal 132 bushels of corn grown for grain and, similarly, 44 bushels of wheat, 76 bushels of oats, and 4½ tons of alfalfa-grass mixture. Soils and land types that are not suited to the crops, pasture, or hay specified in table 1 are not listed.

Yields are expected to increase as new methods and new varieties of crops are developed, but the relative yields on different soils are not expected to change.

Use of Soils as Woodland[1]

Dauphin County originally had a dense cover of trees, but clearings for farms and cuttings for commercial purposes eliminated the virgin stands of timber. More than 45 percent of the land area is commercial woodland, but the stands are second and third growth. The principal forest types (*14*) [2] that make up the present woodland and the proportionate extent of each, as given by United States Forest Service (*18*), are as follows:

	Percentage of total woodland in the county
Northern red oak	54
Northern red oak is pure or predominant. Associates are black oak, scarlet oak, chestnut oak, and yellow-poplar.	
Chestnut oak	22
Chestnut oak is pure or predominant. The common associates are scarlet oak, white oak, black oak, pitch pine, blackgum, and red maple.	
Eastern redcedar	10
Eastern redcedar is pure or predominant. Associates are gray birch, red maple, sweet birch, quaking aspen, and bigtooth aspen.	
Oak-white pine	3
Chestnut oak and eastern white pine are predominant. Tulip-poplar, red oak, white oak, hemlock, and hickories that grow in coves and on northern exposures may occur in mixtures with the pine and oak. Scarlet oak, red maple, pitch pine, and blackgum are associates on southern exposures, upper slopes, and ridges.	
Hard pine-oak	4
Pitch pine, scarlet oak, and chestnut oak are predominant. Associates include Table-Mountain pine, black oak, and blackgum.	
Bottomland hardwoods	7
Northern red oak, basswood, and white ash form the whole stand or a permanent part of it. Associates are sweet birch, American elm, and hemlock.	

Sawtimber grows on approximately 33 percent of the acreage in commercial forests, and poletimber grows on 40 percent. Seedlings and saplings grow on the rest (*18*).

In general the soils in this county are capable of supporting a good growth of red oak, yellow-poplar, ash, and white pine. At present, however, the stands in many wooded areas are made up predominantly of chestnut oak, scarlet oak, black oak, white oak, black birch, and red maple. Trees grow slowly on the shallow soils and on the very poorly drained deep soils.

[1] By V. C. MILES, woodland specialist, Soil Conservation Service.

[2] Italicized numbers in parentheses refer to Literature Cited, p. 101.

TABLE 2.—*Potential productivity, suitable*

[Interpretations are not shown for Made land (Ma), Mine dumps (Md), Muck (Mu), Riverwash (Rv), Strip mine spoil (St),

Soil series and mapping symbols	Potential productivity[1] for upland oaks and yellow-poplar	Species suitability
		Species to favor in existing stands
Albrights: AbA, AbB2	Good	Red oak, yellow-poplar, ash, sugar maple
Andover: AnB, AoB	Good	Red oak, yellow-poplar, ash, sugar maple
Athol: AsB2	Very good	Red oak, black walnut, yellow-poplar, ash, sugar maple.
Atkins: At	Fair; yellow-poplar not adapted	Sycamore, red maple
Barbour: Bb	Excellent	Red oak, black walnut, yellow-poplar, ash, sugar maple.
Basher: Bc	Excellent	Red oak, yellow-poplar, black walnut, ash, sugar maple.
Bedington: BeA, BeB2, BeC2	Very good	Red oak, yellow-poplar, black walnut, ash, sugar maple.
Berks: BhB2, BhC2, BkB2, BkC2, BkD2	Good for upland oaks; yellow-poplar not adapted.	Red oak, black oak, Virginia pine
Brecknock: BrB2, BrC2	Fair for upland oaks; yellow-poplar not adapted.	Red oak, black oak, Virginia pine
Brinkerton and Armagh: BtA, BtB2 (Armagh soils mapped only with Brinkerton soils.)	Good	Red oak, ash, red maple
Buchanan: BuB, BvB	Good	Red oak, yellow-poplar, ash, sugar maple
Calvin: CaB, CaD, CaF	Good for upland oaks; yellow-poplar not adapted.	Red oak, black oak, Virginia pine
Calvin-Klinesville: CkC2, CkD2 (For Klinesville part of CkC2 and CkD2, refer to Klinesville series.)	Fair for upland oaks; yellow-poplar not adapted.	Virginia pine, black oak, chestnut oak
Calvin-Leck Kill: ClA, ClB2, ClC2 (Leck Kill soils mapped only with Calvin soils.)	Good for upland oaks; yellow-poplar not adapted.	Red oak, black oak, Virginia pine, white pine.
Captina: CmB2	Good	Red oak, black oak, yellow-poplar, Virginia pine.

trees, and the hazards to managing woodland

and Urban land (Ua, Ub, Us), and Very stony land (VsC, VsF); these mapping units generally are not suitable as woodland]

Species suitability—Continued	Erosion hazard	Equipment limitations	Seedling mortality	Plant competition for—		Windthrow hazard
Species to favor for planting or seeding				Conifers	Hardwoods	
Yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Moderate	Slight	Slight.
White pine, larch, white spruce, Norway spruce, yellow-poplar.	Slight	Severe	Severe	Moderate	Moderate	Severe.
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Severe	Severe	Slight.
White pine, white spruce	Slight	Severe	Severe	Severe	Severe	Severe.
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
White pine, yellow-poplar, black walnut, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
Virginia pine, white pine, larch, Norway spruce.	Slight	Slight for BhB2, BhC2, BkB2, BkC2; moderate for BkD2.	Moderate	Moderate	Slight	Slight.
Virginia pine, white pine	Slight	Slight	Slight	Slight	Slight	Slight.
White pine, white spruce, larch	Slight	Severe	Severe	Moderate	Moderate	Severe.
Yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Moderate	Slight	Slight.
Virginia pine, white pine, larch, Norway spruce.	Slight for CaB, CaD; moderate for CaF.	Slight for CaB; moderate for CaD; severe for CaF.	Moderate	Moderate	Slight	Slight.
White pine, Virginia pine	Slight	Slight for CkC2; moderate for CkD2.	Severe	Slight	Slight	Slight.
White pine, Virginia pine, larch, Norway spruce.	Slight	Slight	Moderate	Moderate	Slight	Slight.
Yellow-poplar, Virginia pine, white pine, larch, Norway spruce.	Slight	Moderate	Slight	Moderate	Slight	Slight.

TABLE 2.—*Potential productivity, suitable trees,*

Soil series and mapping symbols	Potential productivity[1] for upland oaks and yellow-poplar	Species suitability
		Species to favor in existing stands
Chavies: CnA, CnB2, CnC2	Very good	Red oak, yellow-poplar, black walnut, ash, sugar maple.
Comly: CoB2	Good	Red oak, yellow-poplar, sugar maple, ash
Croton: Cr	Poor; yellow-poplar not adapted	Red maple, sycamore
Dekalb: DcB2, DcC2	Fair for upland oaks; yellow-poplar not adapted.	Black oak, chestnut: oak, white pine, Virginia pine.
Dekalb and Lehew: DlB, DlD, DlF (Lehew soils mapped only with Dekalb soils.)	Fair for upland oaks; yellow-poplar not adapted.	Black oak, chestnut oak, Virginia pine, white pine.
Duffield: DuB2	Excellent	Red oak, black walnut, yellow-poplar, ash, sugar maple.
Duncannon: DvA, DvB2	Very good	Red oak, black walnut, yellow-poplar, ash, sugar maple.
Hagerstown: HaA, HaB2, HaC2	Excellent	Red oak, yellow-poplar, black walnut, ash, sugar maple.
Huntington: Hu	Excellent	Red oak, yellow-poplar, black walnut, ash, sugar maple.
Klinesville: KaB2, KaC2, KaD2, KaE2	Fair for upland oaks; yellow-poplar not adapted.	Virginia pine, chestnut oak, black oak
Laidig: LaB2, LaC2, LdB, LdD	Good	Red oak, yellow-poplar, sugar maple, ash
Lawrenceville: LeB2	Good	Red oak, yellow-poplar, ash, sugar maple
Lehigh: LhB2	Good	Red oak, yellow-poplar, ash, sugar maple, red apple.
Lewisberry: LrB2, LrC2, LrD2, LsD, LsF	Good	Red oak, yellow-poplar, ash, Virginia pine, sugar maple.
Lindside: Lt, Lw	Excellent	Red oak, yellow-poplar, black walnut, ash, sugar maple.

and the hazards to managing woodland—Continued

Species suitability—Continued	Erosion hazard	Equipment limitations	Seedling mortality	Plant competition for—		Windthrow hazard
Species to favor for planting or seeding				Conifers	Hardwoods	
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
White pine, yellow-poplar, larch Norway spruce.	Slight	Slight	Slight	Moderate	Slight	Slight.
White pine, white spruce	Slight	Severe	Severe	Moderate	Moderate	Severe.
White pine, Virginia pine	Slight	Slight	Moderate	Slight	Slight	Slight.
White pine, Virginia Pine	Slight for DlB, DlD; moderate for DlF.	Slight for DlB; moderate for for DlD; severe for DlF.	Moderate	Slight	Slight	Slight.
White pine, black walnut, yellow-poplar, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
Virginia pine, white pine	Slight	Slight for KaB2, KaC2; moderate for KaD2, KaE2.	Severe	Slight	Slight	Slight.
White pine, yellow-poplar, larch, Norway spruce.	Slight	Slight for LaB2, LaC2, LdB; moderate for LdD.	Slight	Moderate	Slight	Slight.
Yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight	Slight	Moderate	Slight	Slight.
White pine, white spruce, larch, yellow-poplar.	Slight	Moderate	Moderate	Severe	Moderate	Moderate.
White pine, larch, Norway spruce, Virginia pine, yellow-poplar.	Slight for LrB2, LrC2, LrD2, LsD; moderate for LsF.	Slight for LrB2, LrC2; moderate for LsD; severe for LsF.	Moderate	Moderate	Slight	Slight.
White pine, yellow-poplar, black walnut, larch, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.

TABLE 2.—*Potential productivity, suitable trees,*

Soil series and mapping symbols	Potential productivity[1] for upland oaks and yellow-poplar	Species suitability
		Species to favor in existing stands
Neshaminy: NeC2, NsB, NsD	Very good	Red oak, yellow-poplar, black walnut, ash, sugar maple.
Penn: PeB2, PeC2	Good	Red oak, yellow-poplar, Virginia pine, white pine.
Philo: Ph	Excellent	Red oak, yellow-poplar, black walnut, sugar maple, ash.
Readington: RdB2	Good for upland oaks; yellow-poplar not adapted.	Red oak, white pine, Virginia pine, sugar maple, yellow-poplar.
Tioga: Ta, Tg	Excellent	Red oak, yellow-poplar, black walnut, ash, sugar maple.
Watchung: Wa, Wc	Fair; yellow-poplar not adapted	Sycamore, red maple
Weikert: WeC2, WeD2, WeE2	Fair; yellow-poplar not adapted	Virginia pine, chestnut oak, black oak

[1] Ratings are explained in text.

A landowner can encourage growth of the more desirable kinds of trees by using good woodland management. The soils and climate in the county are favorable, and help in planning a program of woodland improvement can be obtained from local foresters. The amount of effort the landowner is willing to make toward improving his woodlands probably depends on general economic conditions.

The returns from trees on soils that provide excellent and good woodland sites generally justify the expenditure of money for management. Consideration should be given, however, to the potential yield, the quality of the particular species growing on the site, and the market potential. The species and number of poor quality stems growing on an excellent or good site may prohibit the investment of money for management. Also, the conversion of such areas from their present state to their potential capacity may not be economically justifiable.

Soils that provide fair woodland sites are the most difficult to appraise for forest management. A thorough appraisal of the woodland as to species and quality is essential. The market possibilities should also be investigated. A proper analysis of all of these interrelated factors is essential to determine the intensity of management that is warranted.

The returns from the soils that provide poor woodland sites generally will not justify economically any management to increase wood products. Because of unfavorable soil characteristics, such soils generally will not show a profitable return if used for field crops or for pasture. Although returns may be slight to none if such soils are used as woodland, this use is the most practical one for them.

Of the existing woodland in the county, trees are growing on excellent, very good, and good sites in 52 percent of the acreage, on fair sites in 15 percent, and on poor sites in 33 percent.

Table 2 gives for each soil in the county a rating of potential productivity, a list of species best suited to the soils of the group, ratings for the principal hazards that affect the production of timber, and a rating for limitations to use of equipment for planting and harvesting trees.

Potential productivity rates the soils on general ability to produce timber. These ratings are based on actual measurements of trees on sample plots in the county and in adjacent counties. The ratings are based on the average height attained by dominant and codominant trees at 50 years of age. All soils in this county that have characteristics similar to those of a sampled soil are assumed to have about the same site index as the sampled soil.

A site index of 95 or more for yellow-poplar or of 85 or more for upland oaks is rated *excellent*. The expected yield is 32,150 board feet per acre (International rule)

and the hazards to managing woodland—Continued

Species suitability—Continued	Erosion hazard	Equipment limitations	Seedling mortality	Plant competition for—		Windthrow hazard
Species to favor for planting or seeding				Conifers	Hardwoods	
Black walnut, yellow-poplar, white pine, larch, Norway spruce.	Slight	Slight for NeC2, NsB; moderate for NsD.	Slight	Severe	Moderate	Slight.
White pine, larch, Norway spruce, Virginia pine.	Slight	Slight	Moderate	Moderate	Slight	Slight.
Yellow-poplar, black walnut, larch Norway spruce, white pine.	Slight	Slight	Slight	Severe	Moderate	Slight.
White pine, yellow-poplar, larch, Norway spruce.	Slight	Slight	Slight	Moderate	Slight	Slight.
Black walnut, yellow-poplar, larch, white pine, Norway spruce.	Slight	Slight	Slight	Severe	Moderate	Slight.
White pine, white spruce	Slight for Wa; moderate for Wc.	Severe	Severe	Moderate	Moderate	Severe.
Virginia pine, white pine	Slight	Slight for WeC2; moderate for WeD2, WeE2.	Severe	Slight	Slight	Slight.

for yellow-poplar (*12, 14*) and more than 13,750 board feet per acre for upland oaks (*12, 18*). A site index of 85 to 94 for yellow- poplar or of 75 to 84 for upland oaks is rated *very good.* The expected yield is 24,400 board feet per acre for yellow-poplar and 13,750 for upland oaks. A rating of *good* indicates a site index of 75 to 84 for yellow-poplar or of 65 to 74 for upland oaks. The expected yield for yellow-poplar is 17,620 board feet per acre, and the yield for upland oaks is 9,750 board feet per acre. A site index of 65 to 74 for yellow-poplar or of 55 to 64 for upland oaks is rated *fair.* The expected yield is 11,400 board feet per acre for yellow-poplar and 6,300 board feet per acre for upland oaks. A rating of *poor* indicates a site index of 55 to 64 for yellow-poplar or of less than 54 for upland oaks. The expected yield is 5,600 board feet per acre for yellow-poplar and 3,250 board feet per acre for upland oaks.

The site indexes for other trees, such as white pine, sugar maple, ash, and larch (*12, 14*), vary somewhat from those given for yellow-poplar and upland oaks, but the most suitable sites have the tallest trees of a specified species at 50 years of age. More information on site index for other tree species can be obtained from the Soil Conservation Service and the Pennsylvania Department of Forests and Water.

Species suitability refers to the native trees to favor in the existing stands, and the kinds of trees best suited to planting.

Erosion hazard refers to the risk of erosion. The ratings in table 2 indicate the amount or intensity of practices required to reduce or control erosion on soils of different groups. A rating of *slight* indicates that the risk of erosion is low when woodcrops are harvested, and that few if any practices are needed to control erosion. A rating of *moderate* indicates that erosion control practices are needed on skid trails and logging roads immediately after the harvesting of woodcrops. When the rating is *severe,* erosion, especially gullying, is a severe hazard where woodcrops are harvested. Harvesting and other operations should be across the slope as much as possible. Skid trails and logging roads should be laid out on grades as low as possible, and water-disposal systems should be carefully maintained during logging. Erosion control measures are needed on logging roads and skid trails immediately after logging.

Equipment limitations refer to the restricted uses of harvesting and planting equipment as a result of unfavorable soil characteristics and topographic features, such as steepness of slope, stoniness, and wetness. The rating is *slight* if there are few limitations. It is *moderate* if some problems exist, such as moderately steep slopes or wetness of the soil during some part of the year. The rating is *severe* if prolonged wetness, steepness of slope, or stoniness severely limit use of the equipment. When the rating is *severe,* track-type

equipment is best for general use and winches or similar special equipment are needed for some kinds of work.

Seedling mortality refers to the loss of naturally occurring or planted tree seedlings resulting from unfavorable characteristics of the soils. The rating is *slight* if no more than 25 percent of the planted seedlings are likely to die and if satisfactory restocking from the initial planting can be expected. Adequate restocking ordinarily results from natural regeneration. A rating of *moderate* indicates that between 25 to 50 percent of planted seedlings are likely to die and that some replanting is ordinarily needed. Natural regeneration cannot always be relied on for adequate and early restocking. A rating of *severe* indicates that more than 50 percent of planted seedlings are likely to die and that special preparation of the seedbed, use of superior planting techniques, and considerable replanting are needed for adequate and immediate restocking. When the rating for seedling mortality is *severe*, restocking cannot be expected to result from natural regeneration.

Plant competition refers to the rate at which brush, grass, and undesirable trees are likely to invade the different kinds of soil. The rating is *slight* if unwanted plants do not prevent adequate natural regeneration and early growth or do not interfere with adequate development of planted seedlings. It is *moderate* if competing plants delay natural or artificial regeneration and slow both establishment and growth rates but do not prevent the natural development of a fully stocked normal stand. Plant competition is *severe* if adequate natural or artificial regeneration can be obtained only by intensive site preparation and maintenance, including weeding.

Windthrow hazard is rated by evaluating the factors that control the development of tree roots and consequently the likelihood that trees will be uprooted by wind. A rating of *slight* indicates that normally no trees are blown down by the wind. A rating of *moderate* indicates that some trees are expected to be blown down during periods of excessive soil wetness and high wind. If the rating is *severe*, many trees are expected to be blown down during periods of soil wetness and moderate or high winds.

Use of the Soils for Wildlife[3]

Wildlife is valuable in Dauphin County. The principal game species are white-tailed deer, wild turkey, ruffed grouse, cottontail rabbit, gray squirrel, ring-necked pheasant, and mourning dove. Hunting is primarily for small game, though the annual harvest of deer is good, especially in the northern mountain areas. Some furbearers are trapped, and woodcock, quail, foxes, raccoon, and woodchuck are hunted. Also of much interest in the county is the study of wild plants and nongame animals.

Land use affects the kinds and numbers of wildlife in an area. Of the 332,800 acres in the county, more than 45 percent is second- and third-growth woodland, of which more than half is in tracts of 50 acres or more. Farmland makes up about 44 percent of the county.

The county is divided generally into the largely rural and wooded northern half and the farming and nonrural southern half. In the northern half six forested mountain ranges form barriers that have slowed the building of access roads and development of communities. These ranges are close to each other, but in the fertile valleys between them are farm fields suitable for openland wildlife. But most of the farmland lies southeast of Blue Mountain and east of Lower Paxton and Swatara Townships.

Land use is rapidly changing, and a continued decrease in farmland and an increase in community development are expected. Also, more emphasis is placed on the grassland type of farming. These changes in land use affect the patterns of habitat vegetation and the distribution of wildlife.

Suitability of the soils for wildlife

The wildlife population of a given area depends on the availability of and combination of food, cover, and water. Wildlife habitats may be created, maintained, or improved by establishing desirable vegetation and developing water supplies on suitable soils. Table 3 rates the suitability of the soils in Dauphin County for various elements of wildlife habitat and for three broad classes of wildlife. The categories in table 3 are defined as follows:

Grain and seed crops.—Domestic grains or seed-producing annual herbaceous plants that are planted to produce food for wildlife. Examples are corn, sorghums, wheat, millet, buckwheat, soybeans, and sunflower.

Grasses and legumes.—Domestic perennial grasses and herbaceous legumes that are established by planting and that furnish food and cover for wildlife. Examples are fescue, brome, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, and lespedeza.

Wild herbaceous upland plants.—Native or introduced grasses or forbs that generally are established naturally and that provide food and cover mainly for upland wildlife. Examples are ragweed, wheatgrass, wildrye, oatgrass, pokeweed, strawberry, beggarweed, goldenrod, and dandelion.

Hardwood woody plants.—Deciduous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs, or foliage that are used extensively as food by wildlife. These plants commonly are established naturally but may be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, holly, maple, birch, poplar, grape, honeysuckle, blueberry, raspberry, greenbrier, briers, and roses.

Coniferous woody plants.—Cone-bearing trees and shrubs, important to wildlife primarily as cover but that also furnish food in the forms of browse, seeds, or cones. These plants commonly are established naturally but may be planted. Examples are pine, spruce, white-cedar, hemlock, fir, redcedar, juniper, and yew.

[3] By LEONARD F. BRYNIARSKI and CLAYTON L. HEINEY, wildlife biologists, Soil Conservation Service.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*

[Ratings are omitted for Lindside silt loam, coal overwash (Lw), Made land, sanitary fill (Ma), Mine dumps (Md), Muck (Mu), Riverwash (Rv), Strip mine spoil (St), and Urban land (Ua, Ub, and Us) because these miscellaneous types are to variable to rate]

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water development	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Albrights:											
AbA	2	1	1	1	1	3	3	3	1	1	3
AbB2	2	1	1	1	1	4	4	4	1	1	4
Andover:											
AnB	3	3	2	2	2	3	4	4	3	2	4
AoB	4	3	2	2	2	3	4	4	3	2	4
Athol:											
AsB2	2	1	1	1	1	4	4	4	1	1	4
Atkins:											
At	3	2	2	1	2	3	1	3	2	1	2
Barbour:											
Bb	2	1	1	1	1	4	4	4	1	1	4
Basher:											
Bc	2	1	1	1	1	3	3	3	1	1	3
Bedington:											
BeA	1	1	1	1	1	4	4	4	1	1	4
BeB2, BeC2	2	1	1	1	1	4	4	4	1	1	4
Berks:											
BhB2, BhC2, BkB2, BkC2	2	2	2	2	2	4	4	4	2	2	4
BkD2	3	2	2	2	2	4	4	4	2	2	4
Brecknock:											
BrB2	2	2	2	2	2	4	4	4	2	2	4
BrC2	3	2	2	2	2	4	4	4	2	2	4
Brinkerton and Armagh:											
BtA	3	3	2	2	2	1	1	1	3	2	1
BtB2	3	3	2	2	2	3	4	4	3	2	4
Buchanan:											
BuB	2	1	1	1	1	4	4	4	1	1	4
BvB	4	3	1	1	1	4	4	4	3	1	4
Calvin:											
CaB	4	3	2	2	2	4	4	4	3	2	1
CaD	4	3	2	2	2	4	4	4	3	2	4
CaF	4	4	2	2	2	4	4	4	3	3	4
Calvin-Klinesville:											
CkC2	3	3	2	2	2	4	4	4	3	2	4
CkD2	4	3	2	2	2	4	4	4	3	2	4
Calvin-Leck Kill:											
ClA, ClB2, ClC2	2	2	2	2	2	4	4	4	2	2	4
Captina:											
CmB2	2	1	1	1	1	4	4	4	1	1	4
Chavies:											
CnA	1	1	1	1	1	4	4	4	1	1	4
CnB2, CnC2	2	1	1	1	1	4	4	4	1	1	4
Comly:											
CoB2	2	1	1	1	1	4	4	4	1	1	4
Croton:											
Cr	3	3	2	2	2	1	1	1	3	2	1
Dekalb:											
DcB2, DcC2	2	2	2	2	2	4	4	4	2	2	4

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soil series and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water development	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Dekalb and Lehew:											
DlB, DlD	4	3	2	2	2	4	4	4	3	2	4
DlF	4	4	2	2	2	4	4	4	3	3	4
Duffield:											
DuB2	2	1	1	1	1	4	4	4	1	1	4
Duncannon:											
DvA	1	1	1	1	1	4	4	4	1	1	4
DvB2	2	1	1	1	1	4	4	4	1	1	4
Hagerstown:											
HaA	1	1	1	1	1	4	4	4	1	1	4
HaB2, HaC2	2	1	1	1	1	4	4	4	1	1	4
Huntington:											
Hu	1	1	1	1	1	4	4	4	1	1	4
Klinesville:											
KaB2, KaC2	3	3	2	2	2	4	4	4	3	2	4
KaD2	4	3	2	2	2	4	4	4	3	2	4
KaE2	4	4	2	2	2	4	4	4	3	3	4
Laidig:											
LaB2	2	1	1	1	1	4	4	4	1	1	4
LaC2	3	2	1	1	1	4	4	4	2	1	4
LdB, LdD	4	3	1	1	1	4	4	4	3	1	4
Lawrenceville:											
LeB2	2	1	1	1	1	4	4	4	1	1	4
Lehigh:											
LhB2	2	1	1	1	1	4	4	4	1	1	4
Lewisberry:											
LrB2, LrC2	2	1	1	1	1	4	4	4	1	1	4
LrD2	3	2	1	1	1	4	4	4	2	1	4
LsD, LsF	4	3	1	1	1	4	4	4	3	1	4
Lindside:											
Lt	2	1	1	1	1	3	3	3	1	1	3
Neshaminy:											
NeC2	2	1	1	1	1	4	4	4	1	1	4
NsB, NsD	4	3	2	1	1	4	4	4	3	1	4
Penn:											
PeB2, PeC2	2	2	2	2	2	4	4	4	2	2	4
Philo:											
Ph	2	1	1	1	1	3	3	3	1	1	3
Readington:											
RdB2	2	1	1	1	1	4	4	4	1	1	4
Tioga:											
Ta	2	1	1	1	1	4	4	4	1	1	4
Tg	1	1	1	1	1	4	4	4	1	1	4
Very stony land:											
VsC, VsF	4	4	3	3	3	4	4	4	4	4	4
Watchung:											
Wa	3	2	2	2	2	1	1	1	2	2	1
Wc	4	3	2	2	2	1	1	1	3	2	1
Weikert:											
WeC2	3	3	2	2	2	4	4	4	3	2	4
WeD2	4	3	2	2	2	4	4	4	3	2	4
WeE2	4	4	2	2	2	4	4	4	3	3	4

Wetland food and cover plants.—Annual and perennial, wild, herbaceous plants that grow in moist to wet sites exclusive of submerged or floating aquatic plants. Examples are smartweed, wild millet, wild rice, switchgrass, reed canarygrass, bulrushes, sedges, and cattails.

Shallow water developments.—Water generally not more than 5 feet deep, in excavations or impoundments created by building low dikes and levees, shallow dugouts, or level ditches, or by using devices for water-level control or marshy streams or channels.

Excavated ponds.—Dug-out areas or combinations of dug-out areas and low dikes (dammed areas) that hold water of suitable quality, or suitable depth, and in ample supply for the fish or wildlife. Excavated ponds, for example, should have a surface area of at least a quarter of an acre, and an average depth of 6 feet in at least a quarter of the area. These ponds require a water table that is high most of the time or another source of unpolluted water of low acidity.

Openland wildlife.—Birds and animals that commonly frequent cropfields, meadows, pastures, and areas overgrown with grasses, weeds, and shrubs. Examples are ring-necked pheasant, bobwhite quail, woodcock, mourning dove, meadowlark, killdeer, field sparrow, and cottontail rabbit.

Woodland wildlife.—Birds and animals that commonly frequent wooded areas. Examples are wild turkey, ruffed grouse, wood thrushes, warblers, vireos, deer, raccoon, and squirrel.

Wetland wildlife.—Birds and animals that commonly frequent wet areas such as ponds, marshes, and swamps. Examples are geese, ducks, coot, snipe, rail, heron, beaver, muskrat, and mink.

In table 3 the soils of Dauphin County are rated from 1 to 4 according to their suitability for the eight habitat elements. The ratings are based on limitations of individual soils to produce each of these elements. Not taken into account in the evaluation were present land use, existing vegetation, or relationships to adjoining soils, whether of the same or different series. The meanings of the ratings used are as follows:

Rating 1 stands for *well suited.* This rating means that habitats generally are easily created, improved, or maintained; that the soil has few or no limitations affecting management; and that satisfactory results can be expected.

Rating 2 denotes *suited.* This rating means that habitats can be created, improved, or maintained in most places; that the soil has moderate limitations that affect management; and that moderate intensity of management and fairly frequent attention are required for satisfactory results.

Rating 3 stands for *poorly suited.* This rating means that habitats can be created, improved, or maintained in most places; that the soil has rather severe limitations; that habitat management is difficult and expensive and requires intensive effort; and that results are not always satisfactory.

Rating 4 denotes *unsuited.* This rating means that it is impractical or impossible to create, improve, or maintain habitats and that unsatisfactory results are probable.

Engineering Uses of Soils[4]

Soils are used in engineering primarily as structural material or as foundation material upon which structures are built. Some of the structures for which soil materials are used are roads and airports, building foundations, pipelines, water storage facilities, erosion control structures, drainage systems, and irrigation systems. Among the soil properties most important in engineering are permeability, shear strength, density, shrink-swell potential, water-holding capacity, grain-size distribution, plasticity, and reaction. Also important are depth to a seasonal high water table and depth to bedrock.

This soil survey of Dauphin County contains information that can be used by engineers to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the soil properties that are important in planning agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, pipelines, and airports and in planning detailed investigations at the intended locations.
4. Locate potential sources of sand, gravel, and other construction material.
5. Correlate pavement performance to kinds of soil to develop information that will be useful in designing future roads and in maintaining present roads.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps, reports, and aerial photographs to make maps and reports that can be used by engineers.
8. Estimate the nature of the material to be encountered when excavating for buildings and other structures.
9. Determine the suitability of soils as sites for the infiltration of waste from septic tanks.

With the use of the soil map for identification, the engineering interpretations in this section can be used for many purposes. It should be emphasized, however, that these interpretations may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of the layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations

[4] DONALD MCCANDLESS, assistant State conservation engineer, Soil Conservation Service, assisted in preparing this section.

TABLE 4.—*Engineering*

[Tests performed by the Pennsylvania Department of Highways in accordance with standard

Soil name and location	Parent material	Pennsylvania report number	Depth	Moisture-density data [1]		Mechanical analysis [2]
				Maximum dry density	Optimum moisture	Percentage passing sieve—
						3-in.
			Inches	*Percent*	*Pounds per cubic foot*	
Albrights silt loam (SCS profile No. S64Pa-22-34): Indiantown Gap Military Reservation at west gate on McLean Road.	Colluvium from red shale and sandstone.	BM-46063	20-26	121	13	.....
		BM-46064	26-40	110	17	.....
Atkins silt loam (SCS profile No. S64Pa-22-17): 1,000 feet SE. of intersection of Locust Lane (Route 22071) and Nye's Road (Route 22018).	Alluvium from acid sandstone and shale.	BM-33017	6-18	105	20	.....
		BM-33018	28-60	107	19	.....
Basher silt loam (SCS profile No. S64Pa-22-32): Indiantown Gap Military Reservation.	Alluvium from red shale and sandstone.	BM-46061	13-22	105	19	.....
		BM-46062	30-40	119	12	100
Bedington shaly silt loam (SCS profile No. S63Pa-22-2): Skyline View, 300 feet S. of Valley View Avenue, on Fairville Avenue.	Gray shale and sandstone of Martinsburg formation.	BK-14763	11-26	119	16	.....
		BK-14764	44-64	118	15	100
Berks shaly silt loam (SCS profile No. S64Pa-22-38): Wedgewood Hills, west of Progress Avenue.	Gray shale and sandstone of Martinsburg formation.	BM-45674	11-21	117	14	100
		BM-45675	21-30	116	14	100
Buchanan very stony loam (SCS profile No. S64Pa-22-27): 1.5 miles NW. of Berrysburg, Mifflin Township.	Colluvium from gray sandstone and shale.	BM-44775	15-27	122	12	.....
		BM-44776	27-46	116	13	.....
Calvin shaly silt loam (SCS profile No. S64Pa-22-3): Upper Paxton Township, 1 mile NE. of Millersburg.	Red shale and some sandstone from Mauch Chunk formation.	BM-18159	9-15	119	11	100
		BM-18160	21-27	117	15	100
Chavies fine sandy loam (SCS profile No. S64Pa-22-2): 16 miles N. of Harrisburg on north end of Haldeman Island, Reed Township.	Mixed red and gray, acid and calcareous old alluvium.	BM-18156	12-19	122	12	.....
		BM-18157	49-61	121	11	100
		BM-18158	78-84	129	9	100
Comly silt loam (SCS profile No. S64Pa-22-25): S. of Route 39, between lumber company and Hoover School, near Bell Telephone pole No. 118	Gray shale and sandstone.	BM-42309	16-27	111	18	.....
		BM-42310	27-34	117	15	.....
Duncannon very fine sandy loam (SCS profile No. S64Pa-22-30): Haldeman Island N. of Clark's Ferry Bridge.	Very fine sandy loam eolian deposits.	BM-44781	12-26	122	12	.....
		BM-44782	38-56	118	12	.....
Hagerstown silt loam (SCS profile No. S64Pa-22-28): 1 mile S. of U.S. 422, SW. of Hummelstown on Route T 390.	Weathered limestone.	BM-44777	26-37	109	18	.....
		BM-44778	45-55	111	17	.....
Leck Kill shaly silt loam (SCS profile No. S64Pa-22-23): Lykens Township, 650 feet S. of Route 22067 on T 634 on roadcut.	Red shale and sandstone from Mauch Chunk formation.	BM-42307	15-26	117	13	100
		BM-42308	35-50	117	14	100

[1] Based on "Moisture-Density Relations of Soils Using 5.5-lb. Rammer and 12-in. Drop," AASHO Designation T 99-57 Method A (*1*).

[2] Mechanical analyses according to the AASHO Designation T 88-57 (*1*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[3] Classification based on material smaller than 3 inches.

test data

procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis[2]—Continued									Liquid limit	Plasticity index	Classification[3]	
Percentage passing sieve—Continued					Percentage smaller than—							
¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO[4]	Unified[5]
100	93	86	71	46	39	32	21	16	27	7	A-4(2)	SM-SC
.....	100	99	97	76	73	63	43	33	36	11	A-6(8)	ML-CL
.....	.....	100	99	95	93	77	41	26	39	10	A-4(8)	ML-CL
.....	.....	100	99	97	96	85	60	50	53	25	A-7-6(17)	MH-CH
100	98	95	91	79	77	62	32	17	38	8	A-4(8)	ML
98	94	89	74	35	33	25	14	8	29	3	A-2-4(0)	SM
100	99	96	89	54	50	40	26	22	27	6	A-4(4)	ML-CL
99	89	79	65	35	32	24	16	12	23	3	A-2-4(0)	SM
94	60	45	34	31	30	23	12	9	27	4	A-2-4(0)	GM-GC
88	49	36	25	20	19	15	9	6	28	5	A-1-b(0)	GM-GC
.....	.....	100	79	42	41	33	22	18	24	8	A-4(1)	SC
.....	.....	100	88	67	65	54	36	28	29	11	A-6(7)	CL
98	79	69	57	50	48	37	21	13	25	4	A-4(3)	ML-CL
72	49	44	36	31	30	22	16	12	29	5	A-2-4(0)	GM-GC
.....	.....	100	96	57	48	35	24	13	20	2	A-4(4)	ML
96	94	94	85	45	36	22	12	8	18	0	A-4(2)	SM
93	62	47	30	9	6	3	2	2	(6)	0	A-1-a(0)	SW-SM
100	96	94	90	86	84	70	44	32	33	9	A-4(8)	ML-CL
100	82	66	42	28	27	22	15	12	34	10	A-2-4(0)	SM-SC
.....	.....	100	97	52	46	33	17	14	17	0	A-4(3)	ML
.....	.....	100	95	64	58	36	15	12	19	0	A-4(6)	ML
100	98	93	84	78	76	65	48	40	43	20	A-7-6(13)	CL
100	99	97	91	83	81	70	48	37	33	13	A-6(9)	CL
96	89	85	78	48	42	33	26	22	30	7	A-4(3)	SM-SC
99	96	96	94	62	52	42	31	27	31	7	A-4(5)	ML-CL

[4] Based on "Standard Specifications for Highway Materials and Methods of Sampling and Testing" (Pt. 1, Ed. 8): "The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes," AASHO Designation M 145-49 (*1*).

[5] Based on the Unified Soil Classification System, Technical Memorandum No. 3-357, Volume 1, Waterways Experiment Station, Corps of Engineers, March 1953, revised 1957 (*21*). Soil Conservation Service and Bureau of Public Roads have agreed to consider that all soils having plasticity indexes within 2 points from A-line are to be given a borderline classificaton, for example, ML-CL.

[6] Unable to determine liquid limit; material very sandy.

TABLE 5.—*Estimated engineering*

[Absence of data indicates that no estimate was made. Estimates are not shown for Made land (Ma), Mine dumps (VsC, VsF); their properties are

Soil series and map symbols	Depth to—		Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—				Classification
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Albrights: AbA, AbB2	1½–3	4–6	0–9	0–15	85–100	75–100	60–90	50–85	ML, CL
			9–17	5–15	65–95	55–85	50–80	40–80	GM, GC, SM, ML, SC, CL
			17–58	5–30	65–95	65–90	55–90	30–75	SM, GM, ML, CL, SC, GC
			58						
Andover: AnB, AoB	0–½	3½–8	0–7	0–5	85–95	80–90	60–85	45–75	ML, CL, SM, SC
			7–42	0–10	85–95	80–90	75–85	40–45	SC
			42–46	5–15	70–80	60–70	55–65	25–35	GM, GC
			46						
Armagh: (Mapped only with Brinkerton soils.)	0–½	2–3	0–8		95–100	90–100	80–95	75–85	ML, CL
			8–24		85–95	80–90	70–85	60–90	ML, CL
			24–32		70–80	65–75	60–70	50–60	ML, CL
			32						
Athol: AsB2	3+	3½–6	0–12		90–100	85–95	75–85	60–70	ML
			12–37		90–100	85–95	75–85	60–70	ML, CL
			37–42		90–100	80–90	65–75	35–45	SM
			47						
Atkins: At	0	5+	0–10		90–100	90–100	85–100	60–95	ML, CL
			10–23		100	100	85–100	65–95	ML, MH
			23–48		50–100	50–100	35–95	35–90	GM, GC, ML
Barbour: Bb	3+	5–10	0–8		90–100	90–100	70–100	30–75	ML, SM
			8–70		100	100	70–80	35–50	SM
Basher: Bc	1½–3	4–5	0–12		95–100	90–100	75–100	45–95	ML, SM
			12–50		95–100	90–100	75–100	45–95	ML, SM
			50–60	20–25	35–60	20–30	15–25	10–20	GM, GP-GM, SM, SP-SM
Bedington: BeA, BeB2, BeC2	4+	3½–8	0–10	0–5	70–100	70–100	60–95	40–65	ML, CL, SM
			10–42	0–5	70–100	70–100	60–95	40–65	ML, CL, CH, SM
			42–68	0–10	65–95	55–90	40–85	30–60	SM, ML, CL, GM
Berks: BhB2, BhC2, BkB2, BkC2, BkD2.	4+	2–3½	0–9	0–20	45–70	40–70	35–60	25–60	GM, GL, ML
			9–34	10–30	50–70	35–65	30–60	20–40	SM, GM
			34						
Brecknock: BrB2, BrC2	4+	3½–5	0–8	5–15	70–80	65–75	60–70	55–70	ML, CL
			8–35	5–15	70–80	65–75	60–70	50–60	ML, CL
			35–48	5–15	50–60	45–60	40–50	30–40	GM
			48						
Brinkerton: BtA, BtB2 (For the Armagh soils in these mapping units, refer to the Armagh series.)	0–½	3½–6+	0–7	0–5	95–100	90–100	85–95	70–90	ML, CL
			7–47	0–15	95–100	90–100	85–95	60–80	ML, CL
			47						
Buchanan: BuB, BvB	1½–3	4–6	0–6	0–10	80–100	70–100	55–95	40–80	GM, ML
			6–15	5–15	80–100	70–100	55–95	40–80	GM, ML
			15–50	0–10	60–100	60–100	50–95	30–70	GM, ML
			50						

properties of the soils

(Md), Muck (Mu), Riverwash (Rv), Strip mine spoil (St), Urban land (Ua, Ub, Us), and Very stony land too variable to estimate]

Classification—Continued		Permeability	Available moisture capacity	Reaction	Optimum moisture	Maximum dry density	Shrink-swell potential	Corrosion potential (steel)
AASHO	Dominant USDA texture (typical profile)							
		Inches per hour	*Inches per inch*	*pH*	*Percent*	*Pounds per cubic foot*		
A-4	Silt loam	0.63–2.0	0.14–0.18	4.5–6.0			Low	High.
A-4, A-6	Silty clay loam	0.2–0.63	0.12–0.16	4.5–6.0	13–15	110–120	Low	High.
A-2, A-4, A-6	Sandy clay loam and clay loam	0.2–0.63	0.08–0.12	4.5–5.5	10–17	110–125	Low	High.
	Sandstone and shale.							
A-4	Channery loam	0.63–2.0	0.08–0.12	4.5–5.5			Moderate	High.
A-4	Channery sandy clay loam and channery clay loam	<0.2	0.08–0.12	4.5–5.5	12–16	110–122	Moderate	Moderate.
A-2	Sandy clay loam	<0.2	0.08–0.12	5.0–6.0	10–14	115–125	Moderate	Moderate.
	Sandstone.							
A-4, A-6	Silt loam	0.63–2.0	0.17–0.20	5.0–6.0			Moderate	High.
A-4, A-6, A-7	Silty clay loam and silty clay	<0.2	0.10–0.12	4.5–5.5	16–20	105–115	Moderate	High.
A-4, A-7	Clay loam	0.2–0.63	0.10–0.12	4.5–5.5	14–16	105–115	Moderate	High.
	Shale and sandstone.							
A-4	Silt loam	0.63–2.0	0.16–0.20	6.0–7.0			Low	Moderate.
A-4	Clay loam	0.63–2.0	0.10–0.14	5.5–6.8	14–16	110–120	Low	Low.
A-4	Shaly silty clay loam	0.63–6.3	0.10–0.14	5.5–7.0	12–16	110–120	Low	Low.
	Shale and sandstone.							
A-4, A-6	Silt loam and loam	0.63–2.0	0.16–0.20	4.5–5.5			Moderate	High.
A-4	Loam and silt loam	0.63–2.0	0.14–0.18	4.5–5.5	11–20	105–125	Moderate	High.
A-4, A-7	Very gravelly sandy clay loam	2.0–6.3	0.06–0.10	4.5–5.5	12–19	105–125	Low	High.
A-2, A-4	Silt loam	0.63–2.0	0.15–0.18	5.0–7.0			Low	Moderate.
A-4	Fine sandy loam and sand	2.0–6.3	0.06–0.12	5.0–6.0	12–14	115–120	Low	Moderate.
A-4	Silt loam	0.63–2.0	0.16–0.20	6.0–7.0			Low	Moderate.
A-4	Loam and silt loam	2.0–6.3	0.16–0.20	4.5–6.0	12–19	105–120	Low	Moderate.
A-2	Sand and gravel	>6.3	0.03–0.08	4.5–5.5	10–12	120–125	Low	Moderate.
A-4	Shaly silt loam	0.63–2.0	0.10–0.14	6.5–7.5			Low	Moderate.
A-4, A-7	Shaly silty clay loam	0.63–2.0	0.08–0.12	6.5–7.5	14–22	101–119	Low	Moderate.
A-2, A-4	Very shaly silt loam	2.0–6.3	0.08–0.12	5.5–7.5	14–21	100–118	Low	Moderate.
A-2, A-4, A-6	Shaly silt loam	2.0–6.3	0.10–0.14	5.0–6.0			Low	Low.
A-2, A-4	Shaly silt loam and very shaly silt loam	2.0–6.3	0.06–0.10	5.0–6.0	14–16	110–120	Low	Low.
	Shattered shale.							
A-4, A-6	Channery silt loam	0.63–2.0	0.10–0.14	5.5–7.0			Low	Low.
A-4	Channery clay loam	0.63–2.0	0.08–0.12	5.0–6.5	16–18	110–115	Low	Low.
A-2, A-4	Channery clay loam	0.63–2.0	0.06–0.10	5.0–6.0	16–20	100–105	Low	Low.
	Porcelanite.							
A-4, A-6	Silt loam	0.2–0.63	0.16–0.20	5.0–6.0			Moderate	High.
A-4, A-6	Clay loam and silty clay loam	<0.2	0.08–0.12	5.0–6.0	15–17	110–115	Moderate	Moderate.
	Shale and sandstone.							
A-4, A-6	Very stony loam	2.0–6.3	0.10–0.14	4.5–6.0			Low	Moderate.
A-4	Channery loam and channery clay loam	0.63–2.0	0.08–0.12	4.5–5.5	12–16	115–120	Low	Moderate.
A-2, A-4	Channery candy loam, channery clay loam, and sandy clay loam	<0.2	0.06–0.10	4.5–5.5	10–14	115–120	Low	Moderate.
	Shale and sandstone.							

TABLE 5.—*Estimated engineering properties*

Soil series and map symbols	Depth to—		Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—				Classification
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Calvin: CaB, CaD, CaF, CkC2, CkD2, ClA, ClB2, ClC2. (For the Klinesville soils in CkC2 and CkD2, refer to the Klinesville series; for the Leck Kill soils in ClA, ClB2, and ClC2, refer to the Leck Kill series.)	4+	2–3½	0–9	.....	70–95	55–85	40–80	30–50	SM
			9–21	.....	75–95	55–85	40–80	30–50	SM
			21–27	0–5	40–70	35–65	30–60	25–35	GM, GC, SM
			27	.....	.....	.....	.....	.....	.....
Captina: CmB2	1½–2	6+	0–15	.....	95–100	85–100	80–95	65–80	ML, CL
			15–34	.....	95–100	85–100	80–95	65–90	ML, CL
			34–48	0–10	80–100	70–90	70–80	30–45	SM, SC
			48	.....	.....	.....	.....	.....	.....
Chavies: CnA, CnB2, CnC2	3+	6+	0–12	.....	70–100	65–100	40–100	20–60	ML, SM
			12–28	.....	70–100	65–100	40–100	15–75	ML, SM
			28–66	5–10	30–60	20–75	15–45	5–30	GM, GC, GP, SM, SP
Comly: CoB2	1½–2½	3½–5	0–9	0–10	75–100	70–100	65–100	65–100	ML, CL
			9–23	0–10	75–100	70–100	65–100	65–90	ML, CL
			23–44	0–10	70–100	60–95	40–85	25–60	SM, SC, ML
			44	.....	.....	.....	.....	.....	.....
Croton: Cr	0–1	3½+	0–8	.....	90–100	90–100	75–90	60–80	ML, CL
			8–18	.....	95–100	90–100	80–90	70–80	ML, CL
			18–42	.....	85–95	70–85	50–70	40–50	SM, SC
			42	.....	.....	.....	.....	.....	.....
Dekalb: DcB2, DcC2, DlB, DlD, DlF. (For Lehew soils in DlB, DlD, and DlF, refer to the Lehew series.)	4+	2–3½	0–7	5–20	60–70	40–75	35–65	15–55	SM, GM, ML
			7–26	10–40	60–70	50–60	40–50	30–45	GM, SM
			26–33	10–40	50–60	40–50	30–40	20–30	GM
			33	.....	.....	.....	.....	.....	.....
Duffield: DuB2	4+	5–10	0–13	.....	70–100	70–100	65–95	55–90	ML, CL
			13–54	0–10	90–100	85–95	80–90	70–80	CL, MH
			54–60	0–15	90–100	85–95	85–95	75–85	ML
Duncannon: DvA, DvB2	5+	6–8	0–12	.....	80–100	80–100	75–95	55–80	ML
			12–60	.....	80–100	70–100	60–100	50–65	ML
Hagerstown: HaA, HaB2, HaC2	4+	4–12	0–9	0–5	90–100	90–100	80–100	75–95	ML, CL
			9–60	0–5	95–100	95–100	85–100	75–95	CL, CH, ML, MH
Huntington: Hu	4+	5+	0–18	.....	95–100	90–100	85–100	70–100	ML, CL
			18–48	.....	90–100	85–100	80–100	70–100	ML, CL
Klinesville: KaB2, KaC2, KaD2, KaE2.	4+	1–1½	0–5	0–10	30–70	25–55	20–50	15–35	GM, SM, SC
			5–15	10–20	30–40	25–35	15–25	5–20	GP-GM, GM
Laidig: LaB2, LaC2, LdB, LdD	4+	6+	0–10	5–10	50–60	45–60	40–55	20–30	GM
			10–42	5–10	50–60	45–60	40–55	20–30	GM
			42–60	5–20	50–75	45–70	40–70	15–40	GM, SM
			60	.....	.....	.....	.....	.....	.....
Lawrenceville: LeB2	1½–3	6–8	0–8	.....	95–100	90–100	85–100	80–95	ML
			8–25	.....	95–100	90–100	85–100	80–95	ML, CL
			25–72	.....	85–95	85–95	75–90	50–60	ML, CL
Leck Kill (Mapped only with Calvin soils.)	3+	3½–6	0–10	.....	90–100	85–100	80–95	50–85	ML
			10–25	0–5	90–100	85–95	75–95	35–70	ML, SM, SC
			25–40	0–20	30–55	20–50	15–45	15–35	GM, GC
			40	.....	.....	.....	.....	.....	.....

of the soils—Continued

Classification—Continued		Permeability	Available moisture capacity	Reaction	Optimum moisture	Maximum dry density	Shrink-swell	Corrosion potential (steel)
AASHO	Dominant USDA texture (typical profile)	*Inches per hour*	*Inches per inch*	*pH*	*Percent*	*Pounds per cubic foot*		
A-2, A-4	Shaly silt loam	0.63–6.3	0.10–0.14	5.0–6.5			Low	Low.
A-2, A-4	Shaly silt loam	2.0–6.3	0.08–0.12	4.5–6.5	10–15	120–125	Low	Low.
A-2	Very shaly silt loam	2.0–6.3	0.06–0.10	4.0–5.0	10–15	120–125	Low	Low.
	Shale.							
A-4	Silt loam	0.63–2.0	0.16–0.20	5.0–7.0			Low	Moderate.
A-4, A-6	Loam and silty clay loam	<0.2	0.10–0.14	5.0–6.8	16–18	100–115	Moderate	High.
A-2, A-4	Gravelly loam	0.2–0.63	0.10–0.12	4.0–5.5	12–14	115–120	Moderate	Hugh
	Shale fragments.							
A-2, A-4	Fine sandy loam	2.0–6.3	0.10–0.14	4.5–7.0			Low	Low.
A-4, A-2	Fine sandy loam and sandy loam	2.0–6.3	0.08–0.12	4.5–6.5	10–14	120–130	Low	Low.
A-1, A-2	Gravel and sand and loamy sand	2.0–6.3	0.02–0.06	4.5–5.5	8–12	110–140	Low	Low.
A-4, A-6	Silt loam	0.63–2.0	0.16–0.20	5.0–7.0			Low	Moderate.
A-4, A-6	Silt loam	0.2–0.63	0.14–0.18	5.0–7.0	16–21	106–120	Low	Moderate.
A-2, A-4	Shaly loam and very shaly loam	0.2–0.63	0.12–0.16	5.0–6.5	12–15	109–120	Low	Moderate.
	Soft shale.							
A-4	Silt loam	0.63–2.0	0.16–0.20	5.0–6.5			Low	High.
A-4, A-6	Silt loam, clay loam	<0.2	0.08–0.12	5.0–6.0	18–20	100–105	Moderate	High.
A-4, A-7	Clay loam	<0.2	0.08–0.12	4.5–5.5	14–16	110–115	Moderate	High.
	Shale and sandstone.							
A-2, A-4	Stony sandy loam	2.0–6.3	0.10–0.12	4.0–5.0			Low	Low.
A-2, A-4	Channery sandy loam	2.0–6.3	0.06–0.10	4.0–5.0	10–12	120–125	Low	Low.
A-2	Very channery sandy loam	2.0–6.3	0.05–0.09	4.0–5.0	9–11	120–130	Low	Low.
	Sandstone.							
A-4, A-6	Silt loam	0.63–2.0	0.16–0.20	6.0–6.8			Moderate	Moderate.
A-6	Silty clay loam	0.63–2.0	0.12–0.16	5.5–7.0	15–20	100–105	Moderate	Moderate.
A-6	Silt loam	0.63–2.0	0.15–0.19	5.8–6.2	16–18	110–115	Moderate	Moderate.
A-4	Very fine sandy loam	0.63–2.0	0.10–0.14	5.0–7.0			Low	Low.
A-4	Very fine sandy loam and silt loam	0.63–2.0	0.10–0.14	5.0–6.0	11–14	113–122	Moderate	Moderate.
A-4, A-6	Silt loam	2.0–6.3	0.16–0.20	5.5–7.0			Low	Low.
A-6, A-7	Clay, silty clay and silty clay loam	0.63–2.0	0.10–0.14	4.5–7.0	16–24	100–115	Moderate	Low.
A-4, A-6	Silt loam	0.63–2.0	0.14–0.18	6.0–7.4			Low	Low.
A-4, A-6	Silt loam	0.63–2.0	0.10–0.14	6.0–7.4	14–16	105–110	Low	Low.
A-2	Shaly silt loam	2.0–6.3	0.10–0.14	4.5–6.0			Low	Low.
A-1, A-2	Very shaly silt loam	2.0–6.3	0.04–0.08	4.5–5.5	11–14	125–135	Low	Low.
A-2	Gravelly loam	2.0–6.3	0.09–0.13	4.5–5.5			Low	Low.
A-2	Gravelly sandy loam, gravelly sandy clay loam, and gravelly clay loam	0.63–2.0	0.06–0.10	4.5–5.5	11–13	115–125	Low	Low.
A-2, A-4	Gravelly sandy clay loam	0.2–0.63	0.06–0.10	4.5–5.5	12–14	120–130	Low	Low.
	Sandstone and shale.							
A-4	Very fine sandy loam	2.0–6.3	0.12–0.16	5.0–6.0			Low	Moderate.
A-4	Very fine sandy loam	0.63–2.0	0.10–0.14	5.0–6.5	14–16	105–110	Low	Moderate.
A-4	Fine sandy loam	0.2–0.63	0.10–0.14	4.5–6.5	15–17	100–105	Low	Moderate.
A-4	Shaly silt loam	0.63–2.0	0.10–0.14	5.0–6.5			Low	Low.
A-4	Shaly silt loam and very shaly silt loam	2.0–6.3	0.08–0.12	4.5–6.0	13–17	110–120	Low	Low.
A-2	Weathered shale and silty clay loam	2.0–6.3	0.04–0.08	4.5–5.5	13–17	112–120	Low	Low.
	Shale and sandstone.							

TABLE 5.—*Estimated engineering properties*

Soil series and map symbols	Depth to—		Depth from surface	Coarse fraction greater than 3 inches	Percentage passing sieve—				Classification
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Unified
	Feet	*Feet*	*Inches*	*Percent*					
Lehew (Mapped only with Dekalb soils.)	4+	2–3½	0–4	10–20	60–70	55–65	40–50	25–35	SM, GM
			4–24	10–40	60–70	50–60	45–55	25–35	SM, GM
			24–32	10–40	45–70	35–60	30–55	15–35	SM, GM
Lehigh: LhB2	1–2½	3½–5	32	.....	.....	.....	.....	.....	.....
			0–9	.....	75–85	70–80	70–80	65–75	ML
			9–32	0–5	75–85	70–80	70–80	65–75	ML, CL
			32–48	0–5	50–60	50–60	45–55	40–50	GM, GC
Lewisberry: LrB2, LrC2, LrD2, LsD, LsF.	3+	4+	48	.....	.....	.....	.....	.....	.....
			0–12	.....	70–100	65–90	50–85	25–45	SM
			12–34	.....	55–90	50–75	45–70	25–45	SC, SM, GM
			34–40	.....	30–50	20–45	15–30	5–15	GP-GM, GM
Lindside: Lt, Lw	1½–2½	6+	40–48	.....	.....	.....	.....	.....	.....
			0–42	.....	95–100	95–100	90–100	70–90	ML, CL
			42–60	.....	90–100	90–100	50–95	25–90	ML, SM, CL, SC
Neshaminy: NeC2, NsB, NsD	4+	3½–6							
			0–10	.....	90–100	90–100	75–95	55–80	ML, CL
			10–40	.....	95–100	80–90	55–80	35–65	CL, SM, SC
			40–46	.....	85–100	80–100	55–90	35–65	ML, CL, SM, SC
Penn: PeB2, PeC2	4+	1½–3	46	.....	.....	.....	.....	.....	.....
			0–6	.....	95–100	90–100	85–95	75–85	ML, CL
			6–29	0–5	90–100	70–80	60–70	50–65	ML, CL
Philo: Ph	1½–2½	5+	29	.....	.....	.....	.....	.....	.....
			0–12	.....	100	95–100	95–100	60–75	ML, CL
			12–36	.....	100	95–100	95–100	60–75	ML, CL
Readington: RdB2	1½–2½	3½–5	36–60	.....	60–85	50–70	45–60	20–55	SM, ML, GM
			0–12	.....	90–100	85–100	80–100	75–95	ML
			12–33	.....	90–100	85–100	80–100	75–95	ML, CL
			33–50	.....	85–95	75–90	60–75	50–60	ML, CL
Tioga: Ta, Tg	4+	8+	50	.....	.....	.....	.....	.....	.....
			0–9	.....	70–80	60–70	55–65	40–65	ML, CL, SM, SC
Watchung: Wa, Wc	0–½	4–6	9–60	.....	70–80	60–70	55–65	40–65	ML, CL, SM, SC
			0–8	.....	95–100	95–100	90–100	80–95	ML, CL
			8–37	.....	95–100	95–100	90–100	80–95	ML, CL, CH
			37–48	.....	95–100	90–100	80–90	55–70	ML, CL
Weikert: WeC2, WeD2, WeE2	4+	1–1½	48	.....	.....	.....	.....	.....	.....
			0–7	0–10	30–70	25–65	25–60	20–55	ML, GM
			7–15	10–20	30–45	20–35	10–25	5–20	SM, GM, GP-GM
			15	.....	.....	.....	.....	.....	.....

of the soils—Continued

Classification—Continued		Permeability	Available moisture capacity	Reaction	Optimum moisture	Maximum dry density	Shrink-swell potential	Corrosion potential (steel)
AASHO	Dominant USDA texture (typical profile)	*Inches per hour*	*Inches per inch*	*pH*	*Percent*	*Pounds per cubic foot*		
A-2	Very stony sandy loam and channery loam	2.0–6.3	0.06–0.10	4.5–5.0			Low	Low.
A-2	Channery sandy loam and channery loam	2.0–6.3	0.05–0.09	4.5–5.0	10–15	115–125	Low	Low.
A-2	Very gravelly loam	2.0–6.3	0.04–0.06	4.5–5.0	9–13	115–125	Low	Low.
	Sandstone.							
A-4	Silt loam	0.63–2.0	0.16–0.20	5.0–7.0			Low	Moderate.
A-4, A-6	Silty clay loam, shaly silt clay loam	<0.2	0.10–0.14	5.0–7.0	16–18	105–110	Moderate	Moderate.
A-4, A-7	Very shaly clay loam	<0.2	0.06–0.10	5.0–6.5	14–16	110–115	Low	Moderate.
	Shale.							
A-2, A-4	Gravelly sandy loam	2.0–6.3	0.08–0.12	5.5–6.5			Low	Low.
A-2, A-4	Gravelly sandy clay loam	2.0–6.3	0.06–0.10	5.0–6.0	10–13	117–125	Low	Low.
A-1, A-2	Gravelly sandy clay loam	2.0–6.3	0.06–0.10	4.5–6.0	10–12	117–125	Low	Low.
	Conglomerate.							
A-4, A-6	Silt loam	0.2–0.63	0.16–0.20	6.1–7.0			Moderate	Moderate.
A-2, A-4, A-6	Stratified sand and silt	0.2–0.63	0.12–0.16	5.5–7.0	13–15	110–120	Moderate	Moderate.
A-4, A-6	Gravelly silt loam	0.63–2.0	0.10–0.14	5.0–6.5			Low	Low.
A-4, A-7	Silty clay loam	0.63–2.0	0.10–0.14	5.0–6.0	22–26	105–110	Low	Low.
A-4	Clay loam	0.63–2.0	0.10–0.14	5.0–6.0	24–26	105–110	Low	Low.
	Diabase.							
A-4, A-6	Shaly silt loam	2.0–6.3	0.10–0.14	5.0–6.5			Low	Low.
A-4, A-6	Shaly silt loam and shaly silty clay loam	2.0–6.3	0.08–0.12	4.5–5.5	15–18	110–120	Low	Low.
	Shale fragments.							
A-4, A-6	Silt loam	0.63–2.0	0.16–0.20	5.5–6.5			Low	Moderate.
A-4, A-6	Silt loam, loam, and very fine sandy loam	0.63–2.0	0.16–0.20	4.5–6.0	10–12	110–115	Low	Moderate.
A-2, A-4	Very gravelly silt loam	2.0–6.3	0.06–0.10	4.5–6.0	8–12	115–120	Low	Moderate.
A-4	Silt loam	2.0–6.3	0.16–0.20	5.0–6.5			Low	Moderate.
A-4, A-6	Silty clay loam, silt loam	0.20–0.63	0.12–0.16	4.5–5.5	15–18	105–110	Low	High.
A-4, A-6	Clay loam and shaly clay loam	0.20–0.63	0.08–0.12	4.5–5.5	14–16	110–115	Low	High.
	Shale bedrock.							
A-4	Fine sandy loam	0.63–2.0	0.12–0.16	5.0–6.5	11–13	110–120	Low	Moderate.
A-4	Fine sandy loam and loam	2.0–6.3	0.08–0.12	5.0–6.5	9–11	115–120	Low	Low.
A-4, A-6	Silt loam	2.0–6.3	0.16–0.20	5.0–6.0			Low	High.
A-4, A-7	Clay loam and silty clay loam	<0.2	0.10–0.14	6.0–6.5	19–21	95–105	Moderate	High.
A-4, A-7	Clay loam	<0.2	0.10–0.14	5.5–6.5	15–17	110–115	Moderate	High.
	Diabase.							
A-1, A-2, A-4	Shaly silt loam	2.0–6.3	0.10–0.14	5.0–6.0			Low	Low.
A-1, A-2	Very shaly silt loam	2.0–6.3	0.04–0.08	4.5–5.5	13–15	110–115	Low	Low.
	Shale.							

TABLE 6.—*Engineering*

[Interpretations are omitted Made land (Ma), Mine dumps (Md), Riverwash (Rv), Strip mine

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Albrights: AbA, AbB2.	Poor	Moderate	Fair	Unsuitable.	Fair	Seasonal high water table; seepage on top of fragipan; depth 4 to 6 feet to sandstone bedrock.	Seasonal high water table; depth 4 to 6 feet to bedrock.
Andover: AnB, AoB.	Poor	High	Poor	Unsuitable.	Poor	High water table; seepage; frost heaving; instability; depth 3½ to 8 feet to bedrock.	High water table; depth 3½ to 8 feet to bedrock.
Armagh (Mapped only with Brinkerton soils.)	Unsuitable.	High	Fair	Unsuitable.	Poor	High water table; depth 2 to 3 feet to bedrock.	High water table; depth 2 to 3 feet to bedrock; instability.
Athol: AsB2	Fair	Moderate	Good	Unsuitable.	Fair	Depth 3½ to 6 feet to bedrock.	Depth 3½ to 6 feet to bedrock.
Atkins: At	Poor	High	Fair	Unsuitable.	Fair	High water table; subject to flooding.	High water table; subject to flooding.
Barbour: Bb	Fair	Moderate	Good	Poor	Fair	Subject to flooding	Subject to flooding
Basher: Bc	Poor	High	Fair	Unsuitable.	Fair	Seasonal high water table; subject to flooding.	Seasonal high water table; subject to flooding.
Bedington: BeA BeB2, BeC2.	Fair	Moderate	Good	Unsuitable.	Fair	No unfavorable features	Moderate corrosion potential.
Berks: BhB2, BhC2, BkB2, BkC2, BkD2.	Fair	Moderate	Fair	Unsuitable.	Fair	Depth 2 to 3½ feet to weathered shale bedrock.	Depth 2 to 3½ feet to shale bedrock.
Brecknock: BrB2, BrC2.	Fair	Moderate	Fair	Unsuitable.	Fair	Depth 3½ to 5 feet to bedrock.	Depth 3½ to 5 feet to bedrock.
Brinkerton: BtA, BtB2. (For Armagh soils in these mapping units, refer to Armagh series.)	Poor	High	Poor	Unsuitable.	Poor	High water table; seepage; frost heaving; instability; depth 3½ to 6 feet to bedrock.	High water table; depth 3½ to 6 feet to bedrock.
Buchanan: BuB, BvB.	Poor	Moderate	Fair, poor on stony phases.	Unsuitable.	Fair	Seasonal high water table; seepage on top of fragipan; depth 4 to 6 feet to sandstone bedrock.	Seasonal high water table; depth 4 to 6 feet to bedrock.
Calvin: CaB, CaD, CaF, CkC2, CkD2, ClA, ClB2, ClC2. (For the Klinesville soils in CkC2 and CkD2, refer to the Klinesville series; for the Leck Kill soils in ClA, ClB2, and ClC2, refer to the Leck Kill series.)	Fair	Moderate	Fair	Unsuitable.	Fair	Depth 2 to 3½ feet to bedrock.	Depth 2 to 3½ feet to bedrock.

interpretations of the soils

spoil (St), and Urban land (Ua, Ub, Us); their features are too variable and require onsite investigation]

Soil features affecting engineering practices for—Continued				
Impoundments		Agricultural drainage	Irrigation	Terraces or waterways
Reservoir area	Embankment			
Possible pervious layers in substratum.	Fair stability	Moderately slow permeability; seasonal high water table.	Seasonal high water table; moderately slow permeability.	Seepage on top of fragipan.
Surface stoniness on stony soils; pervious lenses in substratum in some places.	Instability; surface stoniness on stony soils.	Slow permeability; high water table.	Slow permeability; high water table.	High water table; surface stoniness on stony soils; seepage on top of fragipan.
Depth less than 3 feet to bedrock; slow permeability.	Instability; wetness; slow permeability when compacted.	Slow permeability	Slow permeability; high water table.	Seepage; high water table.
Pervious substratum	Difficult to compact; subject to piping.	Not needed	No unfavorable features	No unfavorable features.
Subject to flooding; pervious layers in substratum.	Stable with selective placement; high water table.	Subject to flooding; high water table; outlet problems.	High water table	High water table; subject to flooding.
Subject to flooding; moderate permeability.	Stable with selective placement.	Not needed	Moderate available moisture capacity.	No unfavorable features.
Subject to flooding; pervious layers in substratum.	Stable with selective placement; high water table.	Subject to flooding; seasonal high water; outlet problems.	Seasonal high water table	Not applicable.
Pervious substratum	Difficult to compact; subject to piping.	Not needed	No unfavorable features	No unfavorable features.
Depth 2 to 3½ feet to pervious shale substratum; moderately rapid permeability.	Fair stability; pervious material.	Not needed	Moderate available moisture capacity.	Depth 2 to 3½ feet to shale bedrock.
Depth 3½ to 5 feet to pervious bedrock.	Fair stability	Not needed	Moderate available moisture capalty.	Depth 3½ to 5 feet to bedrock.
Pervious lenses in substratum in some places.	Instability	Slow permeability; high water table.	Slow permeability; high water table.	High water table.
Surface stoniness on stony soils; pervious layers in substratum in some places.	Fair stability; surface stoniness on stony soils.	Slow permeability; seasonal high water table.	Seasonal high water table; slow permeability.	Seepage on top of fragipan; surface stoniness on stony soils.
Depth 2 to 3½ feet to pervious bedrock; excessive seepage.	Subject to piping; surface stoniness on stony soils.	Not needed	Moderate to low available moisture capacity.	Depth 2 to 3½ feet to bedrock; surface stoniness on stony soils.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Captina: CmB2	Poor	Moderate	Fair	Unsuitable.	Fair	Seasonal high water table; seepage on top of fragipan.	Seasonal high water table.
Chavies: CnA, CnB2, CnC2.	Good	Low	Fair	Good	Good	No unfavorable features.	No special problems
Comly: CoB2	Poor	Moderate	Fair	Unsuitable.	Fair	Seasonal high water table; seepage on top of fragipan; depth 3½ to 5 feet to sandstone bedrock.	Seasonal high water table; depth 3½ to 5 feet to bedrock.
Croton: Cr	Unsuitable.	High	Fair	Unsuitable.	Poor	High water table; instability; susceptible to frost action; depth 3½ feet or more to bedrock.	High water table; depth 3½ feet or more to bedrock.
Dekalb: DcB2, DcC2, DlB, DlD, DlF. (For Lehew soils in DlB, DlD, and DlF, refer to Lehew series.)	Good	Low	Poor	Poor	Good	Depth 2½ to 3½ feet to bedrock; surface stoniness on stony soils.	Depth 2½ to 3½ feet to bedrock.
Duffield: DuB2	Poor	Moderate	Good	Unsuitable.	Fair	Depth 5 to 10 feet to limestone bedrock.	Depth 5 to 10 feet to limestone bedrock.
Duncannon: DvA, DvB2.	Fair	Moderate	Fair	Unsuitable.	Fair	No unfavorable features.	No unfavorable features.
Hagerstown: HaA, HaB2, HaC2.	Poor	Moderate	Good	Unsuitable.	Fair	Bedrock outcrops; depth 4 to 12 feet to limestone bedrock.	Bedrock outcrops; depth 4 to 12 feet to limestone bedrock.
Huntington: Hu	Fair	Moderate	Good	Poor	Fair	Flood hazard	Flood hazard
Klinesville: KaB2, KaC2, KaD2, KaE2.	Good	Low	Poor	Unsuitable.	Fair; limited in quantity.	Depth 1 to 1½ feet to shale bedrock.	Depth 1 to 1½ feet to shale bedrock.
Laidig: LaB2, LaC2, LdB, LdD.	Fair	Low	Fair, poor on stony soils.	Unsuitable.	Good	No unfavorable features.	Stony
Lawrenceville: LeB2.	Poor	High	Fair	Unsuitable.	Fair	Seasonal high water table.	Seasonal high water table.
Leck Kill (Mapped only with Calvin soils.)	Fair	Moderate	Fair	Unsuitable.	Fair	Depth 3½ to 6 feet to bedrock.	Depth 3½ to 6 feet to bedrock.
Lehew (Mapped only with Dekalb soils.)	Good	Low	Poor	Poor	Good	Depth 2 to 3½ feet to bedrock; surface stoniness on stony soils.	Depth 2 to 3½ feet to bedrock.

of the soils—Continued

Soil features affecting engineering practices for—Continued				
Impoundments		Agricultural drainage	Irrigation	Terraces or waterways
Reservoir area	Embankment			
Sand lenses in substratum in some places.	Fair stability	Slow permeability; seasonal high water table.	Seasonal high water table; slow permeability.	Seepage on top of fragipan.
Excessive seepage; pervious layers.	Moderately rapid permeability; fair stability.	Not needed	Moderate to low available moisture capacity; moderately rapid permeability.	Irregular topography in places.
Pervious layers in substratum in some places.	Fair stability	Moderately slow permeability; seasonal high water table.	Seasonal high water table; moderately slow permeability.	Seepage on top of fragipan.
Low seepage losses	Instability; slow permeability when compacted.	Slow permeability; high water table.	Slow permeability; high water table.	High water table.
Depth 2½ to 3½ feet to bedrock; pervious substratum.	Pervious material; surface stoniness on stony soils.	Not needed	Low available moisture capacity.	Depth 2½ to 3½ feet to bedrock; surface stoniness on stony soils.
Sinks and solution channels in limestone bedrock in places.	Fair stability; erodible	Not needed	No unfavorable features	No unfavorable features.
Moderate seepage losses	Fair stability; erodible	Not needed	No unfavorable features	No unfavorable features.
Sinks and solution channels in limestone bedrock in places.	Fair stability; erodible	Not needed	No unfavorable features	Bedrock outcrops and ledges.
Subject to flooding; pervious substratum.	Subject to flooding; fair stability.	Not needed	No unfavorable features	Generally not needed.
Depth 1 to 1½ feet to pervious shale bedrock.	Fair stability; limited quantity.	Not needed	Low available moisture capacity.	Depth 1 to 1½ feet to shale bedrock.
Sandy lenses in substratum.	Fair stability; surface stoniness on stony soils.	Not needed	No unfavorable features	Surface stoniness on stony soils.
Solution channels and caverns in underlying bedrock in places.	Moderate stability	Moderately slow permeability; seasonal high water table.	Seasonal high water table; moderately slow permeability.	Seasonal high water table; seepage on top of fragipan.
Depth 3½ to 6 feet to pervious bedrock.	Subject to piping	Not needed	Low to moderate available moisture capacity.	Depth 3½ to 6 feet to bedrock.
Depth 2 to 3½ feet to bedrock; previous substratum.	Pervious material; surface stoniness on stony soils.	Not applicable	Low available moisture capacity.	Depth 2 to 3½ feet to bedrock; surface stoniness on stony soils.

TABLE 6.—*Engineering interpretations*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Lehigh: LhB2	Fair	Moderate	Fair	Unsuitable.	Good	Seasonal high water table; depth 3½ to 5 feet to bedrock.	Seasonal high water table; depth 3½ to 5 feet to bedrock.
Lewisberry: LrB2, LrC2, LrD2, LsD, LsF.	Good	Low	Poor	Fair	Good	Bedrock below depth of 4 feet.	Some hard rock in places; bedrock below depth of 4 feet.
Lindside: Lt, Lw	Poor	Moderate	Good	Unsuitable.	Fair	Subject to flooding; seasonal high water table.	Fair stability; seasonal high water table; subject to flooding.
Muck: Mu	Unsuitable.	High	Unsuitable; good for mulch or organic matter.	Unsuitable.	Unsuitable.	High water table; soil subsidence.	High water table; soil subsidence.
Neshaminy: NeC2, NsB, NsD.	Fair	Moderate	Good	Unsuitable.	Fair	Depth 3½ to 6 feet to bedrock.	Depth 3½ to 6 feet to bedrock.
Penn: PeB2, PeC2	Fair	Moderate	Fair	Unsuitable.	Fair	Depth 1½ to 3 feet to bedrock.	Depth 1½ to 3 feet to bedrock.
Philo: Ph	Poor	High	Fair	Unsuitable.	Fair	Seasonal high water table; subject to flooding.	Seasonal high water table; subject to flooding.
Readington: RdB2	Poor	Moderate	Fair	Unsuitable.	Fair	Seasonal high water table; depth 3½ to 5 feet to bedrock; seepage on top of fragipan.	Seasonal high water table; depth 3½ to 5 feet to bedrock.
Tioga: Ta, Tg	Fair	Moderate	Good	Poor	Fair	Subject to flooding	Subject to flooding
Very stony land: VsC, VsF.	Poor	Low	Unsuitable.	Unsuitable.	Variable	Stoniness	Stoniness
Watchung: Wa, Wc.	Poor	High	Poor	Unsuitable.	Poor	High water table; susceptible to frost action; unstable; depth 4 to 6 feet to bedrock.	High water table; depth 4 to 6 feet to bedrock.
Weikert: WeC2, WeD2, WeE2.	Good	Low	Poor	Unsuitable.	Fair; limited in quantity.	Depth 1 to 1½ feet to shale bedrock.	Depth 1 to 1½ feet to shale bedrock.

of the soils—Continued

Soil features affecting engineering practices for— Continued				
Impoundments		Agricultural drainage	Irrigation	Terraces or waterways
Reservoir area	Embankment			
Depth 3½ to 5 feet to bedrock.	Good stability and shear strength; slow permeability when compacted.	Slow permeability	Slow permeability; seasonal high water table.	Depth 3½ to 5 feet to bedrock.
Excessive seepage	Fair stability; difficult to compact.	Not needed	Moderate available moisture capacity; moderately rapid permeability.	Difficult to establish vegetation; erodible; bedrock below depth of 4 feet.
Subject to flooding; pervious substratum.	Subject to flooding; fair stability.	Seasonal high water table; subject to flooding; moderately slow permeability.	Seasonal high water table; subject to flooding.	Seasonal high water table; subject to flooding.
High water table; variable stability below water table.	High water table; soil subsidence; unstable.	High water table; soil subsidence; outlet problems.	High water table	Not needed.
Pervious substratum	Difficult to compact; subject to piping.	Not needed	No unfavorable features	Depth 3½ to 6 feet to bedrock.
Depth 1½ to 3 feet to pervious bedrock.	Subject to piping	Not needed	Moderate available moisture capacity.	Depth 1½ to 3 feet to bedrock.
Subject to flooding; pervious layers in substratum.	Stable with selective placement; high water table.	Subject to flooding; seasonal high water table; outlet problems.	Seasonal high water table	Not applicable.
Depth 3½ to 5 feet to bedrock.	Fair stability; erodible	Moderately slow permeability; seasonal high water table.	Moderately slow permeability; seasonal high water table.	Seasonal high water table; seepage on top of fragipan; depth 3½ to 5 feet to bedrock.
Subject to flooding	Stable with selective placement.	Not needed	Moderate available moisture capacity.	Not applicable.
Stoniness	Stoniness	Stoniness	Stoniness	Stoniness.
Pervious weathered bedrock; surface stoniness on stony soils.	Difficult to compact; instability; surface stoniness on stony soils.	High water table; slow permeability; surface stoniness on stony soils.	High water table; slow permeability.	High water table; surface stoniness on stony soils.
Excessive seepage; depth 1 to 1½ feet to pervious bedrock.	Fair stability; limited quantity.	Not needed	Low available moisture capacity.	Depth 1 to 1½ feet to shale bedrock.

and for suggesting the kinds of problems that may be expected.

Most of the information in this section is in tables 4, 5, and 6, but additional information useful in engineering is in other sections of this soil survey, particularly "Descriptions of the Soils" and "Formation and Classifications of Soils."

Some of the terms used by the soil scientists may not be familiar to the engineer, and some terms may have a special meaning in soil science. Several of these terms are defined in the Glossary at the back of this survey.

Engineering classifications systems

The engineering systems now most commonly used to classify soils are the system adopted by the American Association of State Highway Officials (AASHO) (*1*); and the Unified system (*21*), established by the Waterways Experiment station, Corps of Engineers.

In the AASHO system, soil materials are classified in seven principal groups. The groups range from A–1, which consists of gravelly soils of high bearing capacity, to A–7, which consists of clay soils having low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. The AASHO classification for tested soils, with the group index in parentheses, is shown in table 4. The estimated AASHO classification for all soils mapped in the county is given in table 5.

The Unified system is based on the identification of soils according to particle size distribution, plasticity, and liquid limit. In this system SW and SP are symbols for clean sands; SM and SC, for sands with nonplastic or plastic fines (G replaces S if the major coarse fraction is gravel); ML and CL, for nonplastic or plastic fine-grained materials having a low liquid limit; and MH and CH, for nonplastic or plastic fine-grained materials having a high liquid limit.

Soil scientists classify soils by using the textural classification of the U.S. Department of Agriculture. In this system the classification is determined mainly by the percentage of soil particles smaller than 2 millimeters in diameter, or the percentage of sand, silt, and clay.

Engineering test data

Table 4 gives engineering test data for soil profiles that were sampled as representative of several important soil series in Dauphin County. The samples represent modal profiles of soils in these series. Tests were made by the Pennsylvania Department of Highways Soil Test Laboratories, Harrisburg, Pa.

Table 4 gives compaction (moisture-density) data for the tested soils. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with further increase in the moisture content. The maximum density is reported as maximum dry density in pounds per cubic foot, and the optimum moisture content is reported in percent.

The tests for liquid limit and plastic limit measure the effect of water on the consistence of soil material. As the moisture content of a clayey soil is increased from a very dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from the plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

The engineering classifications in table 4 are based on data obtained by mechanical analyses and data from tests that determined liquid limit and plastic limit for the samples. The mechanical analyses were made by combined sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method should not be used in naming textural classes and soil types in the USDA system of soil classification.

Estimated engineering properties

Table 5 lists for the soils of Dauphin County estimates of soil properties for layers of a typical profile that are significant in engineering. The estimates are based on field classification and descriptions, physical and chemical tests of selected representative samples, test data for soils in adjacent counties, and knowledge gained from engineering experience with similar soils. Since the estimates cover only typical soils, considerable variations from the values given can be expected. Some of the column heads in table 5 need no explanation; others are explained in the following paragraphs. More information on the range of properties of the soils can be obtained in other sections of this survey.

Permeability relates only to downward movement of water through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of each soil. Plowpans, surface crusts, and other properties resulting from use of the soils are not considered. Ratings of permeability are given in words and in specific values in the Glossary.

The available moisture capacity, expressed in inches per inch of soil depth, is the approximate amount of water available to plants between field moisture capacity and the wilting point. Field moisture capacity is the moisture content of a soil, expressed in percentage of oven-dry weight, after free water has drained away. The wilting point is the percentage of moisture in a soil at which plants wilt and do not recover when placed in a dark, humid atmosphere.

The reaction of a soil, expressed as a pH value, is the degree of acidity or alkalinity of the soil. The pH value and relative terms used to describe soil reaction are defined in the Glossary.

The shrink-swell potential is an indication of the volume change to be expected with a change in moisture content. It is estimated primarily on the basis of the amount and type of clay present. In general, soils

classified as CH and A-7 have a moderate to high shrink-swell potential. A high shrink-swell potential indicates hazards to structures constructed in, on, or with such soil materials. Clean sand and gravel, which are soils that contain small amounts of nonplastic to slightly plastic fines (silt and clay), and most other nonplastic to slightly plastic soil materials have low shrink-swell potential.

Corrosion potential, as used in table 5, indicates the potential danger to uncoated steel structures through chemical action that dissolves or weakens the structural material. Structural materials may corrode when buried in soil, and a given material may corrode in some kinds of soils more rapidly than in others. Extensive installations that intersect soil boundaries of more than one kind of soil or soil horizons of different textures are more likely to be damaged by corrosion than are installations entirely on or in one kind of soil or soil horizon.

Interpretation of soil properties for use in engineering

In table 6 the soils of Dauphin County are rated according to their suitability and limiting features for engineering uses. The ratings are given for winter grading, susceptibility to frost action, and suitability as a source of topsoil, sand and gravel, and road fill. Also listed in table 6 are features that affect several kinds of engineering uses. Unfavorable or detrimental features are emphasized, but important desirable features also may be listed. The ratings and other interpretations in this table are based on the data given in tables 4 and 5 and on field experience.

The suitability of soils for winter grading is determined chiefly by soil features, especially unfavorable ones, that affect the moving, mixing, and compacting of soils when temperatures are below freezing. Fine-textured soils are the least suitable.

Ratings for susceptibility to frost action are determined chiefly by the depth to and duration of the water table and by the content of fines in the soils. In this county, silty soils that have a seasonal high water table have high susceptibility.

Use of a soil as topsoil depends on the organic-matter content. Highly fertile soils, or soils rich in organic matter, are used as topdressing for lawns, gardens, roadbanks, and the like. The ratings in table 6 indicate suitability for such use.

Ratings for sand and gravel are based on the probability that specific areas of the soils contain deposits of sand and gravel. The ratings do not indicate quality or size of the deposits.

Road fill is soil material used to build embankments. Suitability depends largely on the texture of the soil and the natural content of water. Fine sands and silty soils are difficult to compact, are highly erodible, and are less suitable for road fill than coarser sand and gravel. The ratings in table 6 indicate the performance of soil material as road fill that is moved from borrow areas.

In appraising features of soils for vertical alinement of highways, the kinds of soil material, as well as the soil drainage, must be considered. Shallowness to bedrock and presence of boulders influence vertical alinement of highways. Flood plains must have special consideration. In Dauphin County a seasonal high water table is important.

Pipeline construction is affected by features of the undisturbed soil, such as slope, depth to bedrock, depth to and duration of the water table, stoniness or rockiness, hazard of flooding, and corrosion potential. For example, hard bedrock at a shallow depth increases the cost of excavation and backfilling; a seasonal water table accelerates corrosion of the pipe.

Reservoir areas are affected mainly by loss of water through seepage. Some of the soil features listed that influence such seepage are pervious layers, depth to pervious bedrock, and a high water table.

Suitability of soils for construction of embankments, or dams, is determined by soil features in both the subsoil and the underlying material. Table 6 lists such features as wetness, slow permeability when compacted, stability, and a high water table.

The need for agricultural drainage is influenced by features of the undisturbed soils, such as permeability, depth to water table, and susceptibility to flooding.

Soils that are suitable for irrigation generally are well drained, but they contain enough fine material to have favorable moisture-holding capacity.

The construction of terraces and waterways is affected by soil features such as depth to bedrock, stoniness, seepage, and a high water table.

Use of Soils in Community Development

The soil survey contains basic information that is useful in drafting land-use plans for the county or its political subdivisions. The soil map is published at a scale that generally is suitable for most aspects of community planning. Interpretive maps can be made from the soil map and the information in tables 5, 6, 7, and 8 to assist in determining limitations of different areas for various uses.

Table 7 was made for general guidance of planning officials and developers who are concerned with the most suitable uses of land and with avoiding mistakes and costly changes in plans. Table 7 also will aid the individual who is looking for a place to live in the country. Although the maps and tables serve as a guide and will eliminate some sites from further consideration, they do not supplant direct, detailed, onsite investigation when a development is being planned. In this section the soil features are given major consideration. Not considered are location in relation to established business centers or transportation lines and other economic factors that are important and often decide the ultimate use of an area.

This section gives ratings based on the limitations of soils where they are used for community developments. The ease or difficulty of making improvements is largely controlled by the characteristics of the soils. Table 7 lists all the soils in the county and shows the major kinds and estimated degree of limitations that affect use for the various purposes listed.

Soil features that are related to the uses of land for community developments are depth of soil over bed-

TABLE 7.—*Major limitations that influence use of the soils for*

[Not included in this table are Made land (Ma), Mine dumps (Md), Strip mine

Soil series and map symbols	Onsite disposal of effluent from septic tanks	Sewage lagoons	Sites for homes of 3 stories or less with basements
Albrights:			
AbA	Severe: moderately slow permeability; seasonal high water table.	Slight	Moderate: seasonal high water table.
AbB2	Severe: seasonal high water table; moderately slow permeability.	Moderate: slope	Moderate: seasonal high water table.
Andover:			
AnB, AoB	Severe: high water table; slow permeability.	Moderate: slope	Severe: high water table
Athol:			
AsB2	Slight	Moderate: moderate permeability; slope.	Slight
Atkins:			
At	Severe: flooding; high water table.	Severe: flooding	Severe: flooding; high water table.
Barbour:			
Bb	Severe: flooding; seasonal high water table.	Severe: flooding	Severe: flooding
Basher:			
Bc	Severe: flooding; seasonal high water table.	Severe: flooding	Severe: flooding
Bedington:			
BeA	Slight	Severe: moderately rapid permeability in substratum.	Slight
BeB2	Slight	Severe: moderately rapid permmeability in substream.	Slight
BeC2	Moderate: slope	Severe: slope	Moderate: slope
Berks:			
BhB2, BkB2	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; moderately rapid permeability.	Moderate: 2 to 3½ feet to bedrock; slope.
BhC2, BkC2	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; slope; moderately rapid permeability.	Moderate: 2 to 3½ feet to bedrock; slope.
BkD2	Severe: slope	Severe: slope	Severe: slope
Brecknock:			
BrB2	Moderate: 3½ to 5 feet to bedrock.	Moderate: 3½ to 5 feet to bedrock; slope.	Moderate: 3½ to 5 feet to bedrock.
BrC2	Moderate: 3½ to 5 feet to bedrock; slope.	Severe: slope	Severe: 3½ to 5 feet to bedrock; slope.
Brinkerton and Armagh:			
BtA	Severe: high water table	Slight	Severe: high water table
BtB2 (Armagh and Brinkerton soils mapped only in BtA and BtB2.)	Severe: high water table	Moderate: slope	Severe: high water table
Buchanan:			
BuB	Severe: seasonal high water table; slow permeability.	Moderate: slope	Moderate: seasonal high water table.
BvB	Severe: seasonal high water table; slow permeability.	Moderate: slope	Moderate: seasonal high water table; stoniness.

community developments, and estimated degree of limitation

spoil (St), and Urban land (Ua, Ub, Us). They are too variable to be rated]

Lawns and landscaping at homesites	Streets and parking lots	Sanitary land fill	Cemeteries
Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Slight	Moderate: slope; seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Moderate: slope	Slight	Slight.
Severe: flooding; high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.
Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Slight	Slight	Slight	Slight.
Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: 2 to 3½ feet to bedrock; slope.	Moderate: 2 to 3½ feet to bedrock; slope.	Moderate: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock.
Moderate: 2 to 3½ feet to bedrock; slope.	Severe: slope	Moderate: 2 to 3½ feet to bedrock; slope.	Moderate: 2 to 3½ feet to bedrock; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: 3½ to 5 feet to bedrock; slope.	Moderate: 3½ to 5 feet to bedrock.	Moderate: 3½ to 5 feet to bedrock.
Moderate: slope	Severe: slope	Severe: 3½ to 5 feet to bedrock; slope.	Moderate: 3½ to 5 feet to bedrock; slope.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Moderate: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: coarse fragments	Moderate: seasonal high water table; slope.	Severe: seasonal high water table.	Severe: seasonal high water table; stoniness.

TABLE 7.—*Major limitations that influence use of the soils for community*

Soil series and map symbols	Onsite disposal of effluent from septic tanks	Sewage lagoons	Sites for homes of 3 stories or less with basements
Calvin:			
CaB	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; moderately rapid permeability.	Moderate: 2 to 3½ feet to bedrock; stoniness.
CaD	Severe: 2 to 3½ feet to bedrock; slope.	Severe: 2 to 3½ feet to bedrock; slope.	Severe: slope.
CaF	Severe: slope.	Severe: slope.	Severe: slope.
Calvin-Klinesville:			
CkC2 (For Klinesville part, refer to KaC2.)	Severe: 1 to 1½ feet to bedrock.	Severe: 1 to 1½ feet to bedrock; slope.	Moderate: 1 to 1½ feet to bedrock; slope.
CkD2 (For Klinesville part, refer to KaD2.)	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope.	Severe: slope.
Calvin-Leck Kill:			
ClA, ClB2	Severe: 2 to 3½ feet to bedrock.	Severe: moderately rapid permeability.	Moderate: 2 to 3½ feet to bedrock.
ClC2 (Leck Kill soils mapped only with Calvin soils in ClA, ClB2, and ClC2.)	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; slope.	Moderate: 2 to 3½ feet to bedrock.
Captina:			
CmB2	Severe: seasonal high water table; slow permeability.	Moderate: slope.	Moderate: seasonal high water table.
Chavies:			
CnA	Slight: hazard of ground water contamination.	Severe: moderately rapid permeability.	Slight.
CnB2	Slight: hazard of ground water contamination.	Severe: moderately rapid permeability.	Slight.
CnC2	Moderate: slope; hazard of ground water contamination.	Severe: slope; moderately rapid permeability.	Moderate: slope.
Comly:			
CoB2	Severe: moderately slow permeability; seasonal high water table.	Moderate: slope.	Moderate: seasonal high water table.
Croton:			
Cr	Severe: high water table; slow permeability.	Slight.	Severe: high water table.
Dekalb:			
DcB2	Severe: 2 to 3½ feet to bedrock.	Severe: moderately rapid permeability; 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.
DcC2	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; moderately rapid permeability; slope.	Severe: 2 to 3½ feet to bedrock.
Dekalb and Lehew:			
DlB	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; moderately rapid permeability.	Severe: 2 to 3½ feet to bedrock.
DlD	Severe: 2 to 3½ feet to bedrock; slope.	Severe: 2 to 3½ feet to bedrock; slope; moderately rapid permeability.	Severe: 2 to 3½ feet to bedrock; slope.

developments, and estimated degree of limitation—Continued

Lawns and landscaping at homesites	Streets and parking lots	Sanitary land fill	Cemeteries
Moderate: 2 to 3½ feet to bedrock; stoniness.	Moderate: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock; stoniness.	Severe: stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: 1 to 1½ feet to bedrock; slope.	Severe: slope	Severe: 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock.
Moderate: 2 to 3½ feet to bedrock; slope.	Severe: slope	Moderate: 2 to 3½ feet to bedrock; slope.	Moderate: 2 to 3½ feet to bedrock; slope.
Slight	Moderate: seasonal high water table; slope.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Slight	Slight	Slight: hazard of ground water contamination.	Slight.
Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Severe: slope	Moderate: slope; hazard of ground water contamination.	Moderate: slope.
Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: channery surface texture.	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.
Moderate: channery surface texture; slope.	Severe: 2 to 3½ feet to bedrock; slope.	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.
Moderate: coarse fragments; stoniness.	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; stoniness.
Severe: slope	Severe: slope	Severe: 2 to 3½ feet to bedrock; slope.	Severe: 2 to 3½ feet to bedrock; slope; stoniness.

TABLE 7.—*Major limitations that influence use of the soils for community*

Soil series and map symbols	Onsite disposal of effluent from septic tanks	Sewage lagoons	Sites for homes of 3 stories or less with basements
DIF (Lehew soils mapped only with Dekalb soils in DIB, DID, and DIF.)	Severe: slope	Severe: slope	Severe: slope
Duffield: DuB2	Slight: hazard of ground water contamination.	Moderate: moderate permeability; hazard of ground water contamination.	Slight
Duncannon: DvA	Slight	Moderate: moderate permeability.	Slight
DvB2	Slight	Moderate: moderate permeability; slope.	Slight
Hagerstown: HaA, HaB2	Moderate: 4 to 12 feet to bedrock; hazard of ground water contamination.	Moderate: moderate permeability; hazard of ground water contamination. Slope also a limitation on HaB2.	Moderate: 4 to 12 feet to bedrock; hazard of sinkholes.
HaC2	Moderate: 4 to 12 feet to bedrock; slope; hazard of ground water contamination.	Severe: slope; hazard of ground water contamination.	Moderate: 4 to 12 feet to bedrock; slope; hazard of sinkholes.
Huntington: Hu	Moderate: flooding; hazard of ground water contamination.	Moderate: flooding	Moderate: flooding
Klinesville: KaB2	Moderate: flooding; hazard of ground water contamination.	Severe: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.
KaC2	Severe: 1 to 1½ feet to bedrock.	Severe: slope; 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.
KaD2, KaE2	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope
Laidig: LaB2	Severe: moderately slow permeability.	Moderate: slope	Slight
LaC2	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope
LdB	Severe: moderately slow permeability.	Moderate: slope	Moderate: stoniness
LdD	Severe: moderately slow permeability; slope.	Severe: slope	Severe: slope
Lawrenceville: LeB2	Severe: moderately slow permeability; seasonal high water table.	Moderate: slope	Moderate: seasonal high water table.
Lehigh: LhB2	Severe: seasonal high water table; slow permeability.	Moderate: 3½ to 5 feet to bedrock.	Moderate: 3½ to 5 feet to bedrock.
Lewisberry: LrB2	Moderate: 4 feet or more to bedrock.	Severe: moderately rapid permeability.	Moderate: 4 feet or more to bedrock.

developments, and estimated degree of limitation—Continued

Lawns and landscaping at homesites	Streets and parking lots	Sanitary land fill	Cemeteries
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: slope	Slight	Sight.
Slight	Slight	Slight	Slight.
Slight	Moderate: slope	Slight	Slight.
Slight	Moderate: 4 to 12 feet to bedrock. Slope also limitation on HaB2.	Moderate: 4 to 12 feet to bedrock; hazard of ground water contamination.	Moderate: 4 to 12 feet to bedrock.
Moderate: slope	Severe: slope	Moderate: 4 to 12 feet to bedrock; hazard of ground water contamination; slope.	Moderate: slope; 4 to 12 feet to bedrock.
Slight	Slight	Moderate: flooding; hazard of ground water contamination.	Moderate: flooding.
Moderate: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock; slope.	Severe: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.
Moderate: slope; 1 to 1½ feet to bedrock.	Severe: slope	Severe: 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.
Severe: slope	Severe: slope	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope.
Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: stoniness	Moderate: slope	Moderate: stoniness	Severe: stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: stoniness; slope.
Slight	Moderate: slope; seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Slight	Moderate: 3½ to 5 feet to bedrock; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Moderate: gravelly surface texture.	Moderate: slope; 4 feet or more to bedrock.	Moderate: 4 feet or more to bedrock.	Moderate: 4 feet or more to bedrock.

383-854 O - 71 - 4

TABLE 7.—*Major limitations that influence use of the soils for community*

Soil series and map symbols	Onsite disposal of effluent from septic tanks	Sewage lagoons	Sites for homes of 3 stories or less with basements
LrC2	Moderate: slope; 4 feet or more to bedrock.	Severe: slope; moderately rapid permeability.	Moderate: slope; 4 feet or more to be bedrock.
LrD2, LsD, LsF	Severe: slope	Severe: slope	Severe: slope
Lindside: Lt, Lw	Severe: flooding	Severe: flooding	Severe: flooding
Muck: Mu	Severe: high water table	Severe: organic matter	Severe: high water table
Neshaminy: NeC2	Moderate: 3½ to 6 feet to bedrock.	Moderate: slope; moderate permeability.	Slight
NsB	Moderate: 3½ to 6 feet to bedrock.	Moderate: slope; moderate permeability.	Severe: stoniness
NsD	Severe: slope	Severe: slope	Severe: slope; stoniness
Penn: PeB2	Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock; moderately rapid permeability.	Moderate: 1½ to 3 feet to bedrock.
PeC2	Severe: 1½ to 3 feet to bedrock.	Severe: slope; 1½ to 3 feet to bedrock.	Moderate: slope; 1½ to 3 feet to bedrock.
Philo: Ph	Severe: flooding; seasonal high water table.	Severe: flooding	Severe: flooding
Readington: RdB2	Severe: seasonal high water table; moderately slow permeability.	Moderate: slope	Moderate: seasonal high water table.
Riverwash: Rv	Severe: flooding	Severe: flooding	Severe: flooding
Tioga: Ta	Severe: flooding	Severe: flooding; moderately rapid permeability.	Severe: flooding
Tg	Severe: flooding	Severe: flooding; moderately rapid permeability.	Severe: flooding
Very stony land: VsC	Severe: stoniness	Severe: stoniness	Severe: stoniness
VsF	Severe: stoniness; slope	Severe: stoniness; slope	Severe: stoniness; slope
Watchung: Wa	Severe: high water table; slow permeability.	Slight: inflow hazard	Severe: high water table
Wc	Severe: high water table; slow permeability.	Moderate: slope; inflow hazard.	Severe: high water table
Weikert: WeC2	Severe: 1 to 1½ feet to bedrock.	Severe: slope	Moderate: slope; 1 to 1½ feet to bedrock.
WeD2, WeE2	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope	Severe: slope

developments, and estimated degree of limitation—Continued

Lawns and landscaping at homesites	Streets and parking lots	Sanitary land fill	Cemeteries
Moderate: slope; gravelly surface texture.	Severe: slope	Moderate: slope; 4 feet or more to bedrock.	Moderate: slope; 4 feet or more to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: flooding; acid materials also limit Lw.	Severe: flooding	Severe: flooding	Severe: flooding; acid materials also limit Lw.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Moderate: slope	Moderate: 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock.
Moderate: stoniness	Moderate: slope	Moderate: stoniness; 3½ to 6 feet to bedrock.	Severe: stoniness; 3½ to 6 feet to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness.
Moderate: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock; slope.	Moderate: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.
Moderate: slope; 1½ to 3 feet to bedrock.	Severe: slope	Moderate: slope; 1½ to 3 feet to bedrock.	Moderate: slope; 1½ to 3 feet to bedrock.
Moderate: flooding	Severe: flooding	Severe: flooding; seasonal high water table.	Severe: flooding.
Slight	Moderate: slope; seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Moderate: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Slight	Moderate: flooding	Moderate: flooding	Moderate: flooding.
Severe: stoniness	Severe: stoniness	Severe: stoniness	Severe: stoniness.
Severe: stoniness; slope	Severe: stoniness; slope	Severe: stoniness; slope	Severe: stoniness; slope.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table; stoniness.
Moderate: slope; 1 to 1½ feet to bedrock.	Severe: slope	Severe: 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.
Severe: slope	Severe: slope	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope.

rock, degree of slope, permeability, incidence of flooding, depth to seasonal high water table, soil texture, and degree of stoniness. Limitations of soils for the specified uses have been rated as *slight, moderate,* and *severe.* The most favorable soils have been given a rating of *slight,* because they have few limitation to use. A rating of *moderate* indicates soil properties that make necessary special practices to overcome the limitation. A rating of *severe* indicates soil limitations that generally are very difficult and costly to overcome or correct. A rating of severe does not imply that the soil cannot be used for the purpose shown. It does indicate greater limitations than a rating of slight or moderate. If the rate is moderate or severe, the major soil property that causes the limitations is given.

The uses of soils for community developments that are rated in table 7 are discussed in the following paragraphs.

Onsite disposal of sewage effluent.—The main limiting features of soils for this use are restricted permeability, steepness of slope, insufficient depth to bedrock, flooding, the presence of a seasonal high water table, and underlying cavernous limestone through the crevices and solution channels of which seepage from effluent can contaminate underground water. The soils rated slight generally have few or no limitations that affect their use as disposal fields. Those rated moderate may be borderline soils and should be investigated carefully at the exact site of installation. On some of the soils rated moderate, drainage fields need to be larger than on those rated slight. All soils rated severe should be very carefully investigated to determine if a disposal field can be expected to function adequately. The ratings in table 7 refer to year-round use of the soils. Limitations on soils for disposal fields for summer camps or for other part-time uses may be less severe than indicated in the table.

Sewage lagoons—The limitations of soils in this county if used for sewage lagoons are much the same as those shown for reservoir areas of impoundments, as given in table 6 in the section "Engineering Uses of Soils." Among the features that mainly control the degree of limitation for sewage lagoons are the incidence of flooding, the amount of seepage, the permeability of the substratum, depth to rock, and the degree of slope.

Sites for homes (with basements).—Table 7 rates the soils as homesite locations for buildings that are 3 stories or less in height and that have less than an 8-foot excavation for basements. Considered in rating the soils are the depth to a high water table, the depth to and the kind of bedrock, the degree of slope, the hazard of flooding, and the need for land shaping and other kinds of landscaping. Flooding is a severe hazard for use of a soil as a homesite. Depth to rock and to a high water table are less severe limitations for buildings that do not have a basement than for those that do.

Lawns and landscaping at homesites.—It is assumed that enough lime and fertilizer are used for plants that are grown. The need for these materials, therefore, is not considered in the ratings for these uses. Suitable soil material is needed in sufficient amounts so that desirable trees and other plants can survive and grow well. Among the important soil properties that determine whether a good lawn can be established are depth of the soil, texture, slope, droughtiness, depth to the water table, and the presence of stones or rocks.

Streets and parking lots.—Soil requirements and limitations for streets and parking lots are similar to those for highways. Table 5 shows the depth to bedrock, the depth to the water table, and soil texture. Table 6 shows the suitability of each soil in the county for road fill, the limitations that affect highway location, and the susceptibility to frost action. Other limiting features that affect the use of soils for streets and parking lots are steepness of slope and flooding. Soils that have slopes of more than 8 percent are severely limited for use as parking lots.

Sanitary land fill.—A sanitary land fill is an area that is used for the disposal of refuse or garbage. The refuse or garbage is covered with enough soil material to meet the requirements of sanitation and to stabilize the fill. The main requirement is for enough soil material to cover the refuse and garbage. If trenches are dug, the depth to underlying rock is especially important. Among features that limit use of soil for land fill are restricted depth to rock, the incidence of flooding, and the presence of a high water table and of stones or rocks. Sinkholes in limestone areas should not be used as refuse disposal areas, because seepage from the refuse can enter solution channels and contaminate underground water. Esthetic, economic, and sociological factors are important in selecting the site for a sanitary land fill, but these factors are not considered in the ratings for this purpose as shown in table 7.

Cemeteries.—Among the requirements for a satisfactory cemetery site are an adequate depth of unconsolidated material that is easily excavated, a seasonal water table that is not less than 6 feet deep, and a location not subject to flooding. A stone-free, medium-textured soil is preferred so that lawns and landscaping can be established and maintained with minimum effort.

Use of Soils for Recreation

Recreation is an important enterprise in Dauphin County. Many new centers of recreation are being developed in and around communities. A knowledge of the different soils in the county is essential in selecting sites for various kinds of outdoor recreational facilities.

Table 8 lists the limitations of the soils for major kinds of recreational uses. Table 6, in the section "Engineering Uses of Soils," gives information on the features of the soils in each soil series that affect the location of highways, the construction of impoundments, and other uses. In table 5, estimates are given of soil features important in engineering.

In table 8, each soil is rated for recreational uses in terms of degree of limitation. The ratings are slight, moderate, or severe. The degree of limitation indicates the severity of the problems that are likely to be encountered if a specific use is made. The exact basis for a decision to use or not to use a soil for one of these purposes, regardless of its limitation, is beyond the

scope of this publication. The information in table 8 should be used for selecting sites for more detailed onsite investigation.

A rating of *slight* means that a soil has few, if any, limitations for the use specified. A rating of *moderate* means that a soil has one or more properties that limit its use for the purpose specified. Correction of the limiting factors increases the cost of installing and maintaining the facility. A rating of *severe* means that a soil has one or more properties that seriously limit its use for the purpose specified. Correction of some of the limiting factors is possible, but correction of others is prohibitive in cost. The seven major kinds of recreational uses rated in table 8 are discussed in the following paragraphs.

Campsites for tents and trailers.—The ratings under these headings apply to areas suitable for frequent use during the camping season for tent and trailer campsites and for the accompanying activities of outdoor living. These areas require little or no site preparation other than the shaping and leveling of tent and parking areas and insuring that they be suitable for heavy foot traffic by humans or horses or for vehicular traffic. The suitability of the soil for supporting vegetation was not considered in making these ratings but should be considered when an area is selected for a campsite.

Buildings without basements.—These ratings are based on limitations of the soil for use as sites for buildings without basements, such as seasonal and year-round cottages, washrooms and bathhouses, picnic shelters, and service buildings. Soil limitations for buildings with basements are given in table 7. The suitability of a soil for supporting vegetation should be considered when a site is evaluated.

Paths and trails.—These ratings apply to use of soils for trails, cross-country hiking, bridle paths, and nonintensive uses that allow for random movement of people. It is assumed that these areas are to be used as they occur in nature and that little or no soil is to be moved in preparing for the planned recreational use. Swamps, marshes, peat bogs, sand dunes, and some of the other soils and land types have very severe soil limitations for these uses.

Picnic and play areas.—These ratings apply to areas that are to be developed for hiking, picnicking, and casual play where only light foot traffic is expected. These ratings are based only on soil features and do not include the presence of trees or lakes or other features that may affect the desirability of a site. The suitability of a soil for supporting vegetation is a separate item that is to be considered in the final evaluation of selecting sites for these recreational uses.

Athletic fields.—These soil ratings apply to use of the soils for playgrounds and for playing fields for baseball, football, badminton, or other sports. Areas selected for these uses are subject to intensive foot traffic, and generally required are nearly level soils that have good drainage and a soil texture and consistence that give a firm surface. The most desirable soils also are free of rock outcrops and coarse fragments. It should be confirmed that good vegetative cover can be established and maintained on areas where needed.

Golf fairways.—In evaluating the soils for this use, it was assumed that grass, shrubs, and trees are to be grown without adding topsoil or reshaping the surface. Traps and roughs are not considered as part of the fairways.

Descriptions of the Soils

In this section the soils of Dauphin County are described in detail. The approximate acreage and proportionate extent of each mapping unit are shown in table 9.

The procedure in this section is first to describe a soil series, and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read both the description of that unit and the description of the soil series to which the unit belongs. The description of the soil series mentions features that apply to all the mapping units in the series. Differences among the soils of a series are pointed out in the description of the unit described or are indicated by the soil name.

A profile typical for each series is described in two ways. Many will prefer to read the short descriptions in narrative form. It is the second paragraph in the description of each soil series. The technical description of the profile is mainly for soil scientists, engineers, and others who need to make thorough and precise studies of the soils. Colors are for moist soils unless otherwise indicated.

As explained in the section "How this Survey Was Made," not all mapping units are members of a soil series. Riverwash and Mine dumps, for example, are land types that do not belong to any soil series. They are listed, nevertheless, in alphabetic order along with the soil series.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the soil map. Listed at the end of a description of a mapping unit is the capability unit in which the mapping unit has been placed. The "Guide to Mapping Units" at the back of this survey lists the pages where the capability unit is described. Many terms used in the soil descriptions are defined in the Glossary and in the "Soil Survey Manual" (*17*).

Albrights Series

The Albrights series consists of deep, moderately well drained soils that developed in colluvial materials that were derived from red shale and sandstone. These soils generally are gently sloping or sloping and occur at the base of steeper slopes in the northern half of the county. A few scattered areas are south of Hershey.

In a typical profile the surface layer is dark-brown silt loam about 9 inches thick. The upper part of the subsoil is reddish-brown silty clay loam about 8 inches thick. The lower part is a compact layer (fragipan) that consists of light reddish-brown sandy clay loam and yellowish-red clay loam mottled with brownish

TABLE 8.—*Major limitations that influence use of the soils for*

[Not included in this table are Made land, sanitary fill (Ma), Strip mine

Soils and map symbols	Degree and kind of limitations for—		
	Campsites		Service buildings (without basements) in recreational areas
	Tents	Trailers	
Albrights: AbA, AbB2	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight
Andover: AnB, AoB	Severe: high water table	Severe: high water table	Severe: high water table
Athol: AsB2	Slight	Moderate: slope	Slight
Atkins: At	Severe: high water table	Severe: high water table	Severe: high water table
Barbour: Bb	Moderate: flooding	Moderate: flooding	Severe: flooding
Basher: Bc	Moderate: seasonal high water table; flooding	Moderate: seasonal high water table; flooding.	Severe: flooding
Bedington: BeA, BeB2	Moderate: shaly	Moderate: shaly; BeB2 also limited by slope.	Slight
BeC2	Moderate: slope; shaly	Severe: slope	Moderate: slope
Berks: BhB2	Moderate: channery	Moderate: channery; slope	Slight
BhC2	Moderate: channery; slope	Severe: slope	Moderate: slope
BkB2	Moderate: shaly	Moderate: shaly; slope	Slight
BkC2	Moderate: shaly; slope	Severe: slope	Moderate: slope
BkD2	Severe: slope	Severe: slope	Moderate: slope
Brecknock: BrB2	Moderate: channery	Moderate: channery; slope	Slight
BrC2	Moderate: channery; slope	Severe: slope	Moderate: slope
Brinkerton and Armagh: BtA, BtB2 (Armagh and Brinkerton soils are mapped only in BtA and BtB2.)	Severe: high water table	Severe: high water table	Severe: high water table
Buchanan: BuB	Moderate: gravelly; seasonal high water table.	Moderate: gravelly; seasonal high water table; slope.	Slight
BvB	Moderate: stony; seasonal high water table.	Moderate: stony; seasonal high water table.	Slight
Calvin: CaB	Moderate: stony	Moderate: stony; slope	Slight
CaD	Severe: slope	Severe: slope	Moderate: slope
CaF	Severe: slope	Severe: slope	Severe: slope

specified recreational developments, and estimated degree of limitation

spoil (St), and Urban land (Ua, Ub, Us); they are too variable to be rated]

Degree and kind of limitations for—Continued			
Paths and trails in camping areas	Picnic and play areas (extensive use)	Athletic fields (intensive use)	Golf fairways
Slight	Slight	Moderate: seasonal high water table; AbB2—slope.	Slight.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Slight	Moderate: slope	Slight.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Moderate: flooding	Moderate: flooding	Moderate: flooding.
Slight	Moderate: flooding	Moderate: flooding; seasonal high water table.	Severe: flooding.
Moderate: shaly	Moderate: shaly	Severe: shaly	Slight.
Moderate: shaly	Moderate: slope, shaly	Severe: slope, shaly	Moderate: slope.
Moderate: shaly	Moderate: channery	Severe: channery	Moderate: depth 2 to 3½ feet to bedrock; channery.
Moderate: shaly	Moderate: slope, channery	Severe: slope; channery	Moderate: depth 2 to 3½ feet to bedrock; channery; slope.
Moderate: shaly	Moderate: shaly	Severe: shaly	Moderate: depth 2 to 3½ feet to bedrock; shaly.
Moderate: shaly	Moderate: slope; shaly	Severe: slope; shaly	Moderate: slope.
Moderate: slope; shaly	Severe: slope	Severe: slope	Severe: slope.
Moderate: channery	Moderate: channery	Severe: channery	Slight.
Moderate: channery	Moderate: slope, channery	Severe: slope; channery	Moderate: slope.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: gravelly	Moderate: gravelly	Severe: gravelly	Slight.
Moderate: gravelly	Moderate: gravelly	Severe: gravelly	Moderate: stony.
Moderate: shaly	Moderate: shaly	Severe: shaly	Moderate: depth 2 to 3½ feet to bedrock; stony.
Moderate: shaly; slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 8.—*Major limitations that influence use of the soils for specified*

Soils and map symbols	Degree and kind of limitations for—		
	Campsites		Service buildings (without basements) in recreational areas
	Tent	Trailers	
Calvin-Klinesville:			
CkC2 (For Klinesville part, refer to KaC2.)	Moderate: shaly; slope	Severe: slope	Moderate: slope
CkD2 (For Klinesville part, refer to KaD2.)	Severe: slope	Severe: slope	Moderate: slope
Calvin-Leck Kill:			
ClA, ClB2	Moderate: shaly	Moderate: shaly; ClB2 also limited by slope.	Slight
ClC2 (Leck Kill soils mapped only with Calvin soils in ClA, ClB2, and ClC2.)	Moderate: slope; shaly	Severe: slope	Moderate: slope
Captina:			
CmB2	Moderate: seasonal high water table.	Moderate: slope; seasonal high water table.	Slight
Chavies:			
CnA	Slight	Slight	Severe: flooding
CnB2	Slight	Moderate: slope	Severe: flooding
CnC2	Moderate: slope	Severe: slope	Severe: flooding
Comly:			
CoB2	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight
Croton			
Cr	Severe: high water table	Severe: high water table	Severe: high water table
Dekalb:			
DcB2	Moderate: channery	Moderate: channery; slope	Slight
DcC2	Moderate: channery; slope	Severe: slope	Moderate: slope
Dekalb and Lehew:			
DlB	Moderate: stony; channery	Moderate: stony; slope; channery.	Slight
DlD	Severe: slope	Severe: slope	Moderate: slope
DlF (Lehew soils mapped only with Dekalb soils in DlB, DlD, and DlF.)	Severe: slope	Severe: slope	Severe: slope
Duffield:			
DuB2	Slight	Moderate: slope	Slight
Duncannon:			
DvA	Slight	Slight	Slight
DvB2	Slight	Moderate: slope	Slight
Hagerstown:			
HaA	Slight	Slight	Slight
HaB2	Slight	Moderate: slope	Slight

recreational developments, and estimated degree of limitation—Continued

Degree and kind of limitations for—Continued			
Paths and trails in camping areas	Picnic and play areas (extensive use)	Athletic fields (intensive use)	Golf fairways
Moderate: shaly	Moderate: slope; shaly	Severe: slope; shaly	Moderate: slope; depth 1 to 3½ feet to bedrock; shaly.
Moderate: shaly	Severe: slope	Severe: slope	Severe: slope.
Moderate: shaly	Severe: shaly	Severe: shaly	Moderate: shaly.
Moderate: shaly	Moderate: slope; shaly	Severe: slope; shaly	Moderate: slope; depth 2 to 3½ feet to bedrock; shaly.
Slight	Slight	Moderate: slow permeability; seasonal high water table.	Slight.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Slight.
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Slight	Slight	Moderate: seasonal high water table; slope; moderately slow permeability.	Slight.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: channery	Moderate: channery	Severe: channery	Moderate: depth 2 to 3½ feet to bedrock; channery.
Moderate: channery	Moderate: channery; slope	Severe: channery; slope	Moderate: depth 2 to 3½ feet to bedrock; slope; channery.
Moderate: stony; channery	Moderate: channery	Severe: channery	Moderate: depth 2 to 3½ feet to bedrock; channery.
Moderate: slope; stony; channery.	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: slope	Slight.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Slight.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Slight.

TABLE 8.—*Major limitations that influence use of the soils for specified*

Soils and map symbols	Degree and kind of limitations for—		
	Campsites		Service buildings (without basements) in recreational areas
	Tents	Trailers	
HaC2	Moderate: slope	Severe: slope	Moderate: slope
Huntington: Hu	Slight	Slight	Moderate: flooding
Klinesville: KaB2	Moderate: shaly	Moderate: shaly; slope	Moderate: depth 1 to 1½ feet to bedrock.
KaC2	Moderate: shaly; slope	Severe: slope	Moderate: depth 1 to 1½ feet to bedrock; slope.
KaD2	Severe: slope	Severe: slope	Moderate: slope
KaE2	Severe: slope	Severe: slope	Severe: slope
Laidig: LaB2	Moderate: gravelly	Moderate: slope; gravelly	Slight
LaC2	Moderate: slope; gravelly	Severe: slope	Moderate: slope
LdB	Moderate: stony	Moderate: stony; slope	Slight
LdD	Severe: slope	Severe: slope	Moderate: slope
Lawrenceville: LeB2	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight
Lehigh: LhB2	Severe: seasonal high water table.	Severe: seasonal high water table.	Slight
Lewisberry: LrB2	Moderate: gravelly	Moderate: gravelly; slope	Slight
LrC2	Moderate: gravelly; slope	Severe: slope	Moderate: slope
LrD2	Severe: slope	Severe: slope	Moderate: slope
LsD	Severe: slope	Severe: slope	Severe: slope
LsF	Severe: slope	Severe: slope	Severe: slope
Lindside: Lt	Moderate: seasonal high water table; flooding.	Moderate: seasonal high water table; flooding.	Severe: flooding
Lw	Moderate: seasonal high water table; flooding.	Moderate: seasonal high water table; flooding.	Severe: flooding
Mine dumps: Md	Severe: acid material	Severe: acid material	Variable
Muck: Mu	Severe: high water table	Severe: high water table	Severe: high water table
Neshaminy: NeC2	Moderate: slope; gravelly	Severe: slope	Slight
NsB	Moderate: slope; stony	Moderate: slope; stony	Slight
NsD	Severe: slope	Severe: slope	Moderate: slope

recreational developments, and estimated degree of limitation—Continued

Degree and kind of limitations for—Continued			
Paths and trails in camping areas	Picnic and play areas (extensive use)	Athletic fields (intensive use)	Golf fairways
Slight	Moderate: slope	Severe: slope	Moderate: slope.
Slight	Slight	Slight	Slight.
Moderate: shaly	Moderate: shaly	Severe: depth 1 to 1½ feet to bedrock.	Moderate: depth 1 to 1½ feet to bedrock.
Moderate: shaly	Moderate: shaly; slope	Severe: slope; depth 1 to 1½ feet to bedrock.	Moderate: depth 1 to 1½ feet to bedrock; slope.
Moderate: slope; shaly	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: gravelly	Moderate: gravelly	Severe: gravelly	Moderate: gravelly.
Moderate: gravelly	Moderate: slope; gravelly	Severe: slope; gravelly	Moderate: slope; gravelly.
Moderate: gravelly; stony	Moderate: gravelly	Severe: gravelly	Moderate: stony.
Moderate: gravelly; stony; slope.	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: seasonal high water table; slope; moderately slow permeability.	Slight.
Slight	Slight	Severe: seasonal high water table.	Slight.
Moderate: gravelly	Moderate: gravelly	Severe: gravelly	Moderate: gravelly.
Moderate: gravelly	Moderate: slope; gravelly	Severe: slope; gravelly	Moderate: gravelly; slope.
Moderate: slope; gravelly	Severe: slope	Severe: slope	Severe: slope.
Moderate: stony; gravelly	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: flooding	Moderate: flooding; seasonal high water table.	Moderate: flooding.
Slight	Moderate: flooding	Severe: flooding; acid material; seasonal high water table.	Severe: acid material.
Variable	Severe: acid material	Severe: acid material	Severe: acid material.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: gravelly	Moderate: slope; gravelly	Severe: slope; gravelly	Moderate: slope.
Moderate: stony; gravelly	Moderate: gravelly	Severe: gravelly	Moderate: stony.
Moderate: slope; stony; gravelly.	Moderate: slope	Severe: slope	Severe: slope.

TABLE 8.—*Major limitations that influence use of the soils for specified*

Soils and map symbols	Degree and kind of limitations for—		
	Campsites		Service buildings (without basements) in recreational areas
	Tents	Trailers	
Penn:			
PeB2	Moderate: shaly	Moderate: shaly; slope	Slight
PeC2	Moderate: shaly; slope	Severe: slope	Slight
Philo:			
Ph	Moderate: seasonal high water table; flooding.	Moderate: seasonal high water table; flooding.	Severe: flooding
Readington:			
RdB2	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight
Riverwash:			
Rv	Severe: flooding	Severe: flooding	Severe: flooding
Tioga:			
Ta	Moderate: flooding	Moderate: flooding	Severe: flooding
Tg	Slight	Slight	Severe: flooding
Very stony land:			
VsC	Severe: stony	Severe: stony	Severe: stony
VsF	Severe: slope; stony	Severe: slope; stony	Severe: slope; stony
Watchung:			
Wa, Wc	Severe: high water table	Severe: high water table	Severe: high water table
Weikert:			
WeC2	Moderate: shaly; slope	Severe: slope	Moderate: slope; depth 1 to 1½ feet to bedrock.
WeD2	Severe: slope	Severe: slope	Moderate: slope
WeE2	Severe: slope	Severe: slope	Severe: slope

and grayish colors. Water tends to accumulate above the fragipan. The bedrock of red shale and sandstone is at a depth of about 58 inches.

Albrights soils have moderately rapid surface drainage and moderately slow permeability. Available moisture capacity is moderate. These soils are strongly acid to medium acid and have moderate base saturation.

Albrights soils are not extensive in this county, but they are important to farming. They are used mostly for crops.

Typical profile of Albrights silt loam, 3 to 10 percent slopes, moderately eroded, in a hayfield 2¼ miles north of Dauphin Borough, near State Route 225 in Middle Paxton Township:

Ap—0 to 9 inches, dark-brown (7.5YR 4/2) silt loam; weak, fine and medium, granular structure; friable when moist; medium acid; clear, smooth boundary.

B2t—9 to 17 inches, reddish-brown (5YR 4/3) silty clay loam; moderate, medium, subangular block structure; friable when moist, slightly sticky and slightly plastic when wet; common patches of clay films on ped faces; medium acid; clear, wavy boundary.

Bx1—17 to 36 inches, light reddish-brown (5YR 6/3) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/6) and pinkish gray (5YR 6/2); weak, very thick, platy structure that breaks to moderate, fine, subangular blocky; firm and brittle when moist, slightly sticky and slightly plastic when wet; thin, continuous clay films on ped faces; 5 to 10 percent, by volume, is shale fragments; strongly acid; gradual, wavy boundary.

Bx2—36 to 58 inches, yellowish-red (5YR 5/6) clay loam; many, medium, distinct mottles of gray (5YR 6/1) and dark reddish brown (2.5YR 3/4); structure is moderate, medium, subangular blocky and moderate, thick, platy; firm and brittle when moist, slightly sticky and slightly plastic when wet; thin, discontinuous clay films; 5 to 10 percent, by volume, is coarse fragments; very strongly acid; abrupt, smooth boundary.

R—58 inches +, red sandstone and shale bedrock.

The Ap horizon ranges from 7 to 10 inches in thickness and is dark brown or dark reddish brown. From place to place, the individual B horizon textures range from silty clay loam to sandy clay loam. Depth to mottling ranges from 16 to 36 inches. Depth to bedrock ranges from 4 to 6 feet.

recreational developments, and estimated degree of limitation—Continued

Degree and kind of limitations for—Continued			
Paths and trails in camping areas	Picnic and play areas (extensive use)	Athletic fields (intensive use)	Golf fairways
Moderate: shaly	Moderate: shaly	Severe: shaly	Moderate: depth 1½ to 3 feet to bedrock; shaly.
Moderate: shaly	Moderate: shaly; slope	Severe: shaly; slope	Moderate: depth 1½ to 3 feet to bedrock; slope; shaly.
Slight	Moderate: flooding	Moderate: flooding; seasonal high water table.	Moderate: flooding.
Slight	Slight	Moderate: seasonal high water table; slope; moderately slow permeability.	Slight.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Slight	Moderate: flooding	Moderate: flooding	Moderate: flooding.
Slight	Slight	Slight	Slight.
Severe: stony	Severe: stony	Severe: stony	Severe: stony.
Severe: slope; stony	Severe: slope; stony	Severe: stony	Severe: stony.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: shaly	Moderate: slope; shaly	Severe: slope; depth 1 to 1½ feet to bedrock; shaly.	Moderate: depth 1 to 1½ feet to bedrock.
Moderate: slope; shaly	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.

Albrights soils occur with moderately deep, well-drained, closely intermingled Calvin and well-drained, deep Leck Kill soils and with the shallow, well-drained Klinesville soils. They are mottled in the B horizon and have a thicker solum than the Calvin, Leck Kill, and Klinesville soils, which are not mottled in the B horizon.

Albrights silt loam, 0 to 3 percent slopes (AbA).—This soil is adjacent to the flood plains. Most of it has been cleared and cultivated, though small areas are in pasture or trees. The profile of this soil is similar to that described as typical for the series but is deeper to bedrock. Included with this soil in mapping are a few small areas of alluvial deposits.

The main concerns in management are removing excess water from the subsoil and maintaining the organic-matter content in the surface layer. (Capability unit IIw–2)

Albrights silt loam, 3 to 10 percent slopes, moderately eroded (AbB2).—This soil is on the lower slopes of hills and in areas adjacent to flood plains. Runoff is medium, and the erosion hazard is moderate. Most areas have been cleared and cultivated. The profile of this soil is that described as typical for the series. Included with this soil in mapping are several small areas of alluvium on terraces.

The main concerns in management are the seasonal high water table and maintaining the organic-matter content in the surface layer. (Capability unit IIe–5)

Andover Series

The Andover series consists of deep, poorly drained, gently sloping soils on foot slopes. These soils formed in materials weathered from sandstone, conglomerate, and quartzite.

In a typical profile the surface layer, about 2 inches thick, is gray very stony loam. The next layer is grayish-brown channery loam about 5 inches thick. The upper 7 inches of the mottled, very strongly acid subsoil is light brownish-gray channery clay loam, and the lower 28 inches is a firm, brittle layer (fragipan) that consists of light-gray channery sandy clay loam. The underlying material is light brownish-gray

TABLE 9.—*Approximate acreage and proportionate extent of soils*

Soil	Area	Extent
	Acres	*Percent*
Albrights silt loam, 0 to 3 percent slopes	800	0.2
Albrights silt loam, 3 to 10 percent slopes, moderately eroded	1,390	.4
Andover gravelly loam, 3 to 8 percent slopes	330	.1
Andover very stony loam, 0 to 8 percent slopes	1,160	.3
Athol silt loam, 3 to 8 percent slopes, moderately eroded	1,110	.3
Atkins silt loam	9,560	2.9
Barbour silt loam	900	.3
Basher silt loam	4,300	1.3
Bedington shaly silt loam, 0 to 3 percent slopes	370	.1
Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded	6,150	1.8
Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded	1,660	.5
Berks channery silt loam, 3 to 8 percent slopes, moderately eroded	1,050	.3
Berks channery silt loam, 8 to 15 percent slopes, moderately eroded	810	.2
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded	24,450	7.6
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded	9,970	3.0
Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded	4,240	1.3
Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded	2,090	.6
Brecknock channery silt loam, 8 to 20 percent slopes, moderately eroded	1,200	.4
Brinkerton and Armagh silt loams, 0 to 3 percent slopes	1,740	.5
Brinkerton and Armagh silt loams, 3 to 8 percent slopes, moderately eroded	2,700	.8
Buchanan gravelly loam, 3 to 8 percent slopes	500	.2
Buchanan very stony loam, 0 to 8 percent slopes	1,560	.5
Calvin very stony silt loam, 0 to 8 percent slopes	820	.2
Calvin very stony silt loam, 8 to 25 percent slopes	6,070	1.8
Calvin very stony silt loam, 25 to 75 percent slopes	1,040	.3
Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded	4,540	1.4
Calvin-Klinesville shaly silt loams, 15 to 25 percent slopes, moderately eroded	2,230	.7
Calvin-Leck Kill shaly silt loams, 0 to 3 percent slopes	1,620	.5
Calvin-Leck Kill shaly silt loams, 3 to 8 percent slopes, moderately eroded	37,870	11.4
Calvin-Leck Kill shaly silt loams, 8 to 15 percent slopes, moderately eroded	15,670	4.7
Captina silt loam, 3 to 8 percent slopes, moderately eroded	360	.1
Chavies fine sandy loam, 0 to 3 percent slopes	640	.2
Chavies fine sandy loam, 3 to 8 percent slopes, moderately eroded	1,140	.3
Chavies fine sandy loam, 8 to 15 percent slopes, moderately eroded	380	.1
Comly silt loam, 2 to 8 percent slopes, moderately eroded	2,360	.7
Croton silt loam	830	.3
Dekalb channery sandy loam, 3 to 8 percent slopes, moderately eroded	990	.3
Dekalb channery sandy loam, 8 to 15 percent slopes, moderately eroded	1,950	.6
Dekalb and Lehew very stony sandy loams, 0 to 8 percent slopes	7,650	2.3
Dekalb and Lehew very stony sandy loams, 8 to 25 percent slopes	17,900	5.4
Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes	36,860	11.1
Duffield silt loam, 3 to 8 percent slopes, moderately eroded	660	.2
Duncannon very fine sandy loam, 0 to 3 percent slopes	750	0.2
Duncannon very fine sandy loam, 3 to 8 percent slopes, moderately eroded	1,690	.5
Hagerstown silt loam, 0 to 3 percent slopes	640	.2
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	6,940	2.1
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	1,590	.5
Huntington silt loam, local alluvium	420	.1
Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded	630	.2
Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded	760	.2
Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded	2,990	.9
Klinesville shaly silt loam, 25 to 50 percent slopes, moderately eroded	5,530	1.7
Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded	2,490	.7
Laidig gravelly loam, 8 to 20 percent slopes, moderately eroded	2,950	.9
Laidig very stony loam, 0 to 8 percent slopes	2,590	.8
Laidig very stony loam, 8 to 25 percent slopes	26,490	8.0
Lawrenceville very fine sandy loam, 2 to 8 percent slopes, moderately eroded	640	.2
Lehigh silt loam, 3 to 8 percent slopes, moderately eroded	420	.1
Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded	2,080	.6
Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded	2,250	.7
Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	1,210	.4
Lewisberry very stony sandy loam, 5 to 25 percent slopes	910	.3
Lewisberry very stony sandy loam, 25 to 60 percent slopes	420	.1
Lindside silt loam	990	.3
Lindside silt loam, coal overwash	1,450	.4
Made land, sanitary fill	90	(1)
Mine dumps	1,210	.4
Muck	180	.1
Neshaminy gravelly silt loam, 3 to 12 percent slopes, moderately eroded	2,360	.7
Neshaminy very stony silt loam, 0 to 8 percent slopes	840	.3
Neshaminy very stony silt loam, 8 to 25 percent slopes	1,940	.6
Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded	5,510	1.7
Penn shaly silt loam, 8 to 15 percent slopes, moderately eroded	1,300	.4
Philo silt loam	4,090	1.2
Readington silt loam, 3 to 8 percent slopes, moderately eroded	630	.2
Riverwash	2,110	.6
Strip mine spoil	70	(1)
Tioga fine sandy loam	1,320	.4
Tioga fine sandy loam, high bottom	1,980	.6
Urban land, alluvial materials	5,100	1.5
Urban land, limestone materials	2,150	.6
Urban land, shale materials	3,010	.9
Very stony land, sloping	660	.2
Very stony land, steep	4,080	1.2
Watchung silt loam	580	.2
Watchung very stony silt loam	710	.2
Weikert shaly silt loam, 5 to 15 percent slopes, moderately eroded	570	.2
Weikert shaly silt loam, 15 to 25 percent slopes, moderately eroded	580	.2
Weikert shaly silt loam, 25 to 40 percent slopes, moderately eroded	4,280	1.3
Total	332,800	100.0

[1] Less than 0.05 percent.

channery sandy clay loam. Sandstone bedrock occurs at a depth of about 46 inches.

Because of seepage from higher slopes, the water table in these slowly permeable soils is near the surface for long periods.

The native vegetation on Andover soils consists of mixed hardwoods.

Typical profile of Andover very stony loam, 0 to 8 percent slopes, in a wooded area, 4½ miles west of De Hart Dam at the Harrisburg Water Supply Reservoir, and one-quarter mile southeast of YMCA Camp Shikellamy in Clarks Valley near State Route 325:

O1—2 inches to 1 inch, litter of leaves from mixed hardwoods consisting of white oak, water beech, and red maple.

O2—1 inch to 0, organic mat of black (5YR 2/1), partly decayed leaf mold.

A1—0 to 2 inches, gray (N 5/0) very stony loam; weak, fine, granular structure; friable when moist; 20 percent, by volume, is coarse fragments; many large stones on surface; very strongly acid; clear, wavy boundary.

A2g—2 to 7 inches, grayish-brown (2.5Y 5/2) channery loam; few, fine, faint mottles of light gray (10YR 7/1); moderate, medium, subangular blocky structure; friable when moist; 15 to 25 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

B2tg—7 to 14 inches, light brownish-gray (2.5Y 6/2) channery clay loam that has common, medium, distinct mottles of light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6); moderate, medium to coarse, blocky structure; firm when moist; common, thick clay films on ped faces; 25 percent, by volume, is coarse fragments; very strongly acid; gradual, wavy boundary.

Bx—14 to 42 inches, light-gray (2.5Y 7/2) channery sandy clay loam that has common, medium, distinct mottles of strong brown (7.5YR 5/6) and pale brown (10YR 6/3); moderate, thick to very thick, platy structure breaking to moderate, fine, blocky; brittle and very firm when moist; thin clay films on ped faces; 25 percent, by volume, is coarse fragments; very strongly acid; gradual, irregular boundary.

C—42 to 46 inches, light brownish-gray (10YR 6/2) channery sandy clay loam; massive; very firm; 40 percent, by volume, is coarse fragments; strongly acid.

R—46 inches +, sandstone bedrock.

The stones on the surface range from 10 to 30 inches in diameter. The A horizon ranges from very stony loam to gravelly loam. The Bx horizon ranges from loam to channery sandy clay loam. Depth to the fragipan ranges from 14 to 20 inches, and depth to bedrock ranges from 3½ to 8 feet.

Andover soils are adjacent to Buchanan, Laidig, and Dekalb soils. The poorly drained Andover soils are mottled nearer the surface than the moderately well drained Buchanan soils, but the well-drained Laidig soils and Dekalb soils are not mottled.

Andover gravelly loam, 3 to 8 percent slopes (AnB).—This soil is on foot slopes, where it is saturated by seepage from higher elevations. Except for fewer stones and less cobbly material in its thicker surface layer and in its subsoil, this soil has a profile similar to the one described as typical for the series.

The main concerns in management are slow permeability, a high water table, and poor growth of crops. Where this soil is cleared, it is used mainly for hay or as pasture. It is not important to farming in this county. (Capability unit IVw–1)

Andover very stony loam, 0 to 8 percent slopes (AoB).—This soil is at the base of steep slopes. It has the profile described as typical for the series. Included with this soil in mapping are several small areas where the surface layer is black silt loam.

The main management concerns are wetness and stoniness. This soil has not been cleared. It should remain in trees, but intensive woodland practices are needed if trees are to grow well. (Capability unit VIIs–2)

Armagh Series

The Armagh series consists of moderately deep, poorly drained soils on uplands, mostly in areas between the Blue Mountain and U.S. Highway No. 22. These soils are nearly level to gently sloping, and in some places, occupy depressions. Armagh soils formed in material weathered from gray shale, siltstone, and sandstone.

In a typical profile the surface layer is dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil is grayish-brown silty clay loam; the middle is gray silty clay; and the lower part is gray clay loam. The upper part and middle are mottled with yellowish red, and the lower part is mottled with yellowish brown. Shale and sandstone bedrock occur at a depth of 32 inches.

These soils have slow permeability and a high water table. Surface drainage is moderate, but internal drainage is slow to very slow. Available moisture capacity is moderate to high.

The native vegetation consisted of mixed hardwoods. Most areas have been cleared and are used for hay or as pasture.

In this county Armagh soils are more shallow to bedrock than is typical in other counties. Here, they are mapped only with Brinkerton soils in undifferentiated soil groups.

Typical profile of an Armagh silt loam in a nearly level area east of Blue Ridge Country Club and north of State Route 39:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, medium, granular structure; friable when moist; slightly acid; clear, smooth boundary.

B1tg—8 to 12 inches, grayish-brown (2.5Y 5/2) silty clay loam that has common, medium, distinct mottles of yellowish red (5YR 5/8); moderate, coarse, subangular blocky structure; friable when moist, slightly sticky when wet, slightly hard when dry; continuous clay films on ped faces; slightly acid; clear, wavy boundary.

B21tg—12 to 24 inches, gray (2.5Y 6/0) silty clay that has many, medium, distinct mottles of yellowish red (5YR 5/6); strong, medium to coarse, blocky structure; firm when moist, sticky and plastic when wet, hard when dry; continuous clay films on ped faces; very strongly acid; gradual, wavy boundary.

B22tg—24 to 32 inches, gray (2.5Y 6/0) clay loam that has few, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, medium, blocky structure; firm when moist, slightly sticky and plastic when wet; thin patches of clay films; few iron concretions; manganese coatings on ped faces; very strongly acid; clear, wavy boundary.

R—32 inches +, shale and sandstone bedrock.

The Ap horizon ranges from dark grayish brown to grayish brown. Depth to mottling ranges from the surface to a depth of 8 inches. In some places each layer in the B horizon ranges from silty clay to clay loam. The depth to shale bedrock ranges from 2 to 3 feet.

Armagh soils are associated with the Brinkerton soils. The Armagh soils are more shallow to bedrock than the Brinkerton soils, but both kinds of soils are mottled near the surface.

Athol Series

The Athol series consists of deep, well-drained, gently sloping soils that formed in material weathered from calcareous red rocks. These soils are in Conewago and Londonderry Townships in the southern part of the county.

In a typical profile the plow layer is dark reddish-brown silt loam about 9 inches thick. The next layer is reddish-brown silt loam about 3 inches thick. The upper part of the subsoil is red clay loam; the middle is dark-red clay loam; and the lower part is dark-red shaly silty clay loam. Shale and sandstone bedrock is at a depth of about 42 inches.

Athol soils are moderately permeable. Available moisture capacity is moderately high.

Although these soils are not extensive in the county, they are well suited to general farm crops and are important to farming. Most areas are used as cropland.

Typical profile of Athol silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field, east of State Route 743, 1 mile south of Pennsylvania Turnpike in Conewago Township:

Ap—0 to 9 inches, dark reddish-brown (5YR 3/4) silt loam; weak, fine and medium, granular structure; friable when moist; 5 to 10 percent, by volume, is coarse fragments; slightly acid; clear, smooth boundary.

A2—9 to 12 inches, reddish-brown (5YR 5/4) silt loam; moderate, thin, platy structure; medium acid; clear, wavy boundary.

B21t—12 to 27 inches, red (2.5YR 4/6) clay loam; moderate, medium, subangular blocky structure; firm when moist, slightly sticky and plastic when wet; thin, continuous clay films on ped faces; 10 to 15 percent, by volume, is coarse fragments; medium acid; gradual, wavy boundary.

B22t—27 to 37 inches, dark-red (2.5YR 3/6) clay loam; moderate, coarse, subangular blocky structure with some platiness; firm when moist, slightly sticky when wet; thin, discontinuous clay films on ped faces; 10 to 15 percent, by volume, is coarse fragments; medium acid; clear, wavy boundary.

B3—37 to 42 inches, dark-red (2.5YR 3/6) shaly silty clay loam; moderate, medium, subangular blocky structure; firm when moist, sticky when wet; common patches of black (2.5YR 2/0) manganese coatings on shale fragments; 40 to 50 percent, by volume, is shale fragments; slightly acid; clear, irregular boundary.

R—42 inches +, shale and sandstone bedrock.

The B21t and B22t horizons are heavy silt loam or clay loam. The B3 horizon ranges from clay loam to shaly silty clay loam. In places a C horizon occurs and has a high content of coarse shale and sandstone fragments. In most places these fragments have black coatings. Depth to bedrock ranges from 3½ to 6 feet. Reaction throughout the profile ranges from strongly acid to neutral.

The Athol soils occur with the moderately deep, well-drained Penn soils and the deep, moderately well drained Readington soils. The Athol soils are not mottled, as are the Readington soils, which have a seasonal high water table and a fragipan.

Athol silt loam, 3 to 8 percent slopes, moderately eroded (AsB2).—This soil occurs on the sides and tops of hills in the uplands. Included with this soil in mapping are a few areas that have slopes of less than 3 percent. In these included areas the soil is deeper to bedrock than is shown in the profile described as typical. The major concerns in management are control of runoff and erosion and maintaining the content of organic matter in the surface layer. Most areas are cleared and are used for general farm crops. (Capability unit IIe–1)

Atkins Series

The Atkins series consists of deep, poorly drained soils on flood plains. These soils formed in sediments washed mainly from gray, noncalcareous shale and sandstone. They occupy nearly level areas along streams and are subject to occasional flooding.

In a typical profile the surface layer, about 2 inches thick, is very dark grayish-brown silt loam. The next layer, about 8 inches thick, is light brownish-gray loam that has mottles of brownish yellow. The upper part of the subsoil is light brownish-gray loam that is mottled with strong brown. The lower part is light brownish-gray silt loam. The underlying material occurs at a depth of about 23 inches and is reddish-gray very gravelly sandy clay loam.

Although Atkins soils have moderate permeability, the subsoil frequently is saturated for long periods because the water table is high.

The native vegetation of Atkins soils consisted of hardwoods. These soils generally are now used for pasture or hay because the hazards of flooding and wetness prevent use as cropland.

Typical profile of Atkins silt loam in a nearly level area, three-quarters of a mile below the Harrisburg Water Supply Reservoir in Clarks Valley:

O2—2 inches to 0, dark reddish-brown (5YR 3/2) humus.

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; very strongly acid; clear, smooth boundary.

A2—2 to 10 inches, light brownish-gray (10YR 6/2) loam that has common, medium, faint mottles of brownish yellow (10YR 6/6); weak, fine to medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; strongly acid; gradual, wavy boundary.

B21g—10 to 18 inches, light brownish-gray (10YR 6/2) loam that has many, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, medium, subangular blocky strucure; few, thin, discontinuous clay films on ped faces; friable when moist, nonsticky and nonplastic when wet; very strongly acid; clear, wavy boundary.

B22g—18 to 23 inches, light brownish-gray (10YR 6/2) coarse silt loam; weak, medium, subangular blocky structure; friable to loose; very strongly acid; clear, irregular boundary.

IICg—23 to 48 inches, reddish-gray (5YR 5/2) very gravelly sandy clay loam; 50 to 60 percent, by volume, is coarse fragments; single grain; loose; very strongly acid.

The B21g horizon and the B22g horizon each ranges from fine sandy loam to silt loam. The A2 and B horizons typically are light brownish gray, but their color depends on the color of the rock from which the deposited sediments were washed. In many places strata of sand, silt and clay occur throughout the B horizon. Depth to bedrock is more than 5 feet.

Atkins soils are more poorly drained than the Philo soils. In most places the A horizon in the Atkins soils is mottled, but in the Philo soils mottles do not occur above a depth of 15 inches.

Atkins silt loam (At).—This soil occurs along small streams and in low areas that are flooded. Included in the mapping unit are several small swampy areas where the surface layer is black. The main hazards for this soil are flooding and a high water table, but crops can grow well if an adequate drainage system is installed. (Capability unit IIIw–1)

Barbour Series

The Barbour series consists of deep, well-drained, nearly level soils on flood plains. These soils formed in sediments washed mainly from red, noncalcareous shale and sandstone.

In a typical profile the surface layer is dark-brown silt loam about 8 inches thick. The subsoil is dark-brown very fine sandy loam that extends to a depth of 30 inches. To a depth of 50 inches, the underlying material is reddish-yellow fine sandy loam, and the rest is reddish-brown coarse sand mottled with strong brown. Red shale and sandstone bedrock occurs at a depth of about 70 inches.

In Barbour soils permeability and available moisture capacity are moderate. These soils are strongly acid to neutral.

The native vegetation on these soils consisted of hardwoods. Cleared areas that are not subject to frequent flooding are used for pasture or crops.

Typical profile of Barbour silt loam in a nearly level, brushy area along Clark Creek, 2½ miles southwest of the dam of the Harrisburg Water Company:

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) silt loam; weak, medium, granular structure; friable when moist; slightly acid; clear, smooth boundary.

B2—8 to 30 inches, dark-brown (7.5YR 4/4) very fine sandy loam; weak, fine and medium, subangular blocky structure; friable when moist; medium acid; clear, wavy boundary.

C1—30 to 50 inches, reddish-yellow (5YR 6/8) fine sandy loam; single grain; very friable when moist; strongly acid; gradual, irregular boundary.

IIC2—50 to 70 inches, reddish-brown (2.5YR 5/4) coarse sand that has few, faint mottles of strong brown (7.5YR 5/6); massive; very friable when moist; strongly acid; abrupt, smooth boundary.

R—70 inches +, red shale and sandstone bedrock.

The B2 horizon ranges from dark brown to reddish brown. Structure of the B horizon generally is weak, fine or medium, granular or subangular blocky. Color of the C1 horizon is reddish yellow or reddish brown, and texture is fine sandy loam or coarse sand. The profile shown as typical for the Barbour soils in Dauphin County is deeper to coarse sand than is typical for the series in other counties. Depth to bedrock ranges from 5 to 10 feet. Reaction throughout the profile is strongly acid to neutral.

Barbour soils occur with the Basher and Atkins soils. The Barbour soils are well drained and are not mottled above a depth of 36 inches, but the Basher soils are mottled at a depth between 18 and 36 inches, and the gray Atkins soils are mottled near the surface.

Barbour silt loam (Bb).—This soil occurs along small streams and is subject to flooding. This soil has the profile described as typical for the series, but included in mapping are a few gently sloping areas where the surface layer is thinner than that described. Because flooding is the major limitation on this soil, it is used mainly for pasture or hay. (Capability unit IIw–1)

Basher Series

The Basher series consists of deep, moderately well drained, nearly level soils on flood plains. These soils occur along streams in the northern half of the county and in a few scattered areas south of Hershey. They formed in sediments washed from red shale and sandstone and deposited in areas along the streams.

In a typical profile the surface layer is dark reddish-brown silt loam about 12 inches thick. The upper part of the subsoil is reddish-brown silt loam and loam. The middle is strong-brown and yellowish-brown silt loam that is mottled with brownish colors. The lower part of the subsoil is light brownish-gray loam that is mottled with yellowish brown. The underlying material is sand, gravel, and cobblestone fragments and is at a depth of 50 inches.

Runoff on Basher soils is medium. The internal drainage is limited by the seasonal high water table. Permeability is moderate.

The native vegetation on these soils consisted chiefly of hardwoods. Cleared areas are used mostly for pasture or hay. A few areas are plowed and used for crops.

Typical profile of Basher silt loam in a nearly level area, near a stream three-quarters of a mile southeast of Killinger in Upper Paxton Township:

Ap—0 to 12 inches, dark reddish-brown (5YR 3/4) silt loam; weak, medium, granular structure; friable when moist; neutral; clear, wavy boundary.

B21—12 to 20 inches, reddish-brown (5YR 5/4) silt loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; medium acid; clear, wavy boundary.

B22—20 to 26 inches, reddish-brown (5YR 5/4) loam that has few, medium, distinct mottles of pinkish gray; moderate, medium subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; medium acid; gradual, wavy boundary.

B23—26 to 31 inches, strong-brown (7.5YR 5/8) silt loam that has many, medium, distinct mottles of light brown (7.5YR 6/4) and brown (7.5YR 5/2); moderate, medium, blocky and subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; strongly acid; gradual, wavy boundary.

B24—31 to 39 inches, yellowish-brown (10YR 5/6) silt loam that has many, medium, distinct mottles of strong brown (7.5YR 5/6) and light brownish-gray (10YR 6/2); moderate, medium to coarse, blocky structure; friable when moist, nonsticky and nonplastic when wet; 5 to 10 percent, by volume, is coarse fragments; very strongly acid; gradual, wavy boundary.

B25g—39 to 50 inches, light brownish-gray (10YR 6/2) loam that has many, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; friable when moist; 5 to 10 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

IIC—50 to 60 inches, sand, gravel, and cobblestone fragments.

R—60 inches +, red shale and sandstone.

In many places the B horizon has strata of sand, silt, and clay. Depth to mottling ranges from 18 to 36 inches. Depth to bedrock ranges from 4 to 5 feet.

The Basher soils are adjacent to Barbour and Atkins soils. The Basher soils are mottled in the B horizon, whereas

383-854 O - 71 - 5

the well-drained Barbour soils are not mottled. The Basher soils are better drained than the darker colored Atkins soils, which have a higher water table and mottles near or at the surface.

Basher silt loam (Bc).—This soil occurs along streams and is subject to flooding. Because of this flooding and a seasonal high water table, this soil is used mainly for pasture and hay. Drainage systems are needed to remove excessive water when the water table is high. This soil is not suitable for building sites. (Capability unit IIw–1)

Bedington Series

The Bedington series consists of deep, well-drained, nearly level to sloping soils on the uplands. These soils formed in material weathered from gray shale and sandstone. They occur east of Harrisburg in Swatara and South Hanover Townships. A few small areas occur in other townships.

In a typical profile the surface layer is dark yellowish-brown shaly silt loam about 10 inches thick. The subsoil, mainly red in color, extends to a depth of about 50 inches. It is shaly silty clay loam that contains shale fragments, which increase as depth increases. The underlying material is red very shaly silt loam.

In the Bedington soils available moisture capacity and permeability are moderate, and internal drainage is medium.

The native vegetation on these soils was mixed hardwoods. Most areas have been cleared and are used for general farm crops and orchards.

Typical profile of Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile north of Hershey airport, on a Hershey Estates farm (Laboratory No. S64–Pa–22–5–1–9):

Ap—0 to 10 inches, dark yellowish-brown (10YR 4/4) shaly silt loam; weak, fine and medium, granular structure; friable when moist, nonsticky and nonplastic when wet; 17 percent, by volume, is shale fragments and sandstone and quartzite pebbles; neutral; abrupt, smooth boundary.

B1—10 to 13 inches, strong-brown (7.5YR 5/8) shaly silty clay loam; weak, fine, subangular blocky structure; friable when moist, sticky and slightly plastic when wet; Ap material in root channels and wormholes; 20 percent, by volume, is shale fragments; mildly alkaline; clear, wavy boundary.

B21t—13 to 19 inches, red (2.5YR 4/8) shaly silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist, sticky and plastic when wet; prominent clay films on ped faces; Ap material in root channels and wormholes; 20 percent, by volume, is shale fragments; mildly alkaline; gradual, wavy boundary.

B22t—19 to 29 inches, red (2.5YR 5/8) shaly silty clay loam; moderate, medium, subangular blocky structure; friable when moist, sticky and plastic when wet; prominent clay films on peds, in pores, and on shale surfaces; 25 percent, by volume, is shale fragments; mildly alkaline; gradual, irregular boundary.

B23t—29 to 33 inches, yellowish-red (5YR 5/8) shaly silty clay loam; weak, fine, blocky and subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; prominent clay films in pores and on shale surfaces; 20 percent, by volume, is shale fragments; mildly alkaline; clear, irregular boundary.

B24t—33 to 42 inches, red (2.5YR 4/8) shaly silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist, sticky and plastic when wet; prominent clay films on shale surfaces; 35 percent, by volume, is shale fragments; mildly alkaline; clear, irregular boundary.

B3t—42 to 50 inches, red (2.5YR 5/6) very shaly silty clay loam; weak, fine, blocky structure; friable when moist, sticky and slightly plastic when wet; prominent clay films on peds and shale surfaces; 60 percent, by volume, is shale fragments; neutral; clear, broken bondary.

C1—50 to 61 inches, red (2.5YR 5/6) very shaly silt loam; very firm when moist, slightly sticky when wet; prominent clay films in pores, and many iron and manganese coatings on shale surfaces; 80 percent, by volume, is shale fragments; slightly acid; gradual, wavy boundary.

C2—61 to 68 inches, red (2.5YR 5/8) very shaly silt loam; very firm when moist, slightly sticky when wet; few to common iron and manganese coatings and some clay films on shale surfaces; 90 percent, by volume, is red (2.5YR 5/6) shale fragments; medium acid.

The B horizon ranges from shaly light silty clay loam to very shaly silty clay loam. Depth to bedrock ranges from 3½ to 8 feet. In this county pH value in Bedington soils is higher throughout the profile than is typical for the series in other counties.

The Bedington soils are associated with the Berks, Comly, Armagh, and Brinkerton soils. The Bedington soils are deep and well drained, but the Berks soils, though well drained and free of mottles, are more shallow to bedrock than Bedington soils. These soils are brownish and red in the B horizon, but the Brinkerton and Armagh soils are poorly drained, are dominantly gray, and are mottled near the surface. Also, the Brinkerton soils have a fragipan. Unlike the Comly soils, which are moderately well drained and mottled at a depth of 18 to 30 inches, the Bedington soils are well drained and free of mottles.

Bedington shaly silt loam, 0 to 3 percent slopes (BeA).—This slightly eroded soil occurs on ridgetops and benches. Its profile has a thicker surface layer and subsoil than the profile described as typical for the series. Included with this soil in mapping are several moderately eroded areas where the surface layer is thinner than that described as typical. The main concern in management is maintaining the organic-matter content in the surface layer. Only the ordinary practices of good management are needed on this soil. (Capability unit I–1)

Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded (BeB2).—This soil is mostly on ridgetops and broad upland areas. It has the profile described as typical for the series. Included with this soil in mapping are a few small severely eroded areas that have a thinner profile than that described as typical. Also included, at the base of slopes, are several small areas of a colluvial soil that has a thicker profile than this soil. Most areas of this soil have been cleared and are used for general farm crops. The main concerns in management are controlling erosion and maintaining the organic-matter content in the surface layer. Practices that control surface water reduce erosion by retarding runoff. (Capability unit IIe–1)

Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded (BeC2).—This soil occupies areas about halfway between ridgetops and stream channels. Its surface layer and subsoil are thinner than corresponding layers in the profile described as typical

for the series. Included with this soil in mapping are several severely eroded areas. Also, included, at the base of slopes, are a few small areas of a colluvial soil that has a thicker profile than that described as typical for the series. Most areas of this Bedington soil have been cleared and are used for general farm crops. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIIe–1)

Berks Series

The Berks series consists of moderately deep, well-drained soils on uplands. These soils are gently sloping to moderately steep. Where they are moderately steep, slopes are short. Berks soils occur in an area between the foothills of Blue Mountain and Hershey. The area is about 6 miles wide and extends from Harrisburg eastward to the Lebanon County line. These soils formed in material weathered from noncalcareous, gray shale and sandstone.

In a typical profile the surface layer, about 9 inches thick, is dark-brown shaly silt loam. The subsoil extends to a depth of 24 inches. It is yellowish-brown and strong-brown shaly and very shaly silt loam containing shale fragments that increase with depth. The underlying material is light olive-brown very shaly silty clay loam. Light olive-brown, shattered shale occurs at a depth of 34 inches.

Berks soils have moderately rapid permeability and moderate available moisture capacity.

The native vegetation on these soils consisted of mixed hardwoods. Most areas have been cleared and are used for general farm crops.

Typical profile of Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded, in an idle field, one-quarter mile south of Blue Ridge Country Club House:

Ap—0 to 9 inches, dark-brown (10YR 4/3) shaly silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; 15 to 20 percent, by volume, is shale fragments; medium acid; clear, smooth boundary.

B1—9 to 14 inches, yellowish-brown (10YR 5/4) shaly silt loam; weak, fine and medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; thin patches of silt coatings and clay films on ped faces; 15 to 20 percent, by volume, is thin shale fragments 1/16 to 1/4 inch thick and 1/2 to 2 inches long; medium acid; clear, wavy boundary.

B2—14 to 24 inches, strong-brown (7.5YR 5/6) very shaly silt loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; 60 percent, by volume, is shale fragments, 1/8 to 1/4 inch thick and 1/2 to 2 inches long; medium acid; gradual, wavy boundary.

C—24 to 34 inches, light olive-brown (2.5Y 5/4) very shaly silty clay loam; weak, fine, subangular blocky structure modified by shale fragments; 75 to 85 percent, by volume, is shale fragments.

R—34 inches +, light olive-brown shattered shale.

The A horizon ranges from channery silt loam to shaly silt loam, and the B horizon from channery loam to very shaly silt loam. The coarse fragments in the B horizon average more than 50 percent by volume. They are 1/2 inch to 4 inches long and 1/8 to 1/2 inch thick. Depth to bedrock ranges from 2 to 3 1/2 feet.

The Berks soils are associated with the Weikert, Bedington, Comly, and Brinkerton soils. The Berks soils have a thicker solum than the well-drained Weikert soils and are deeper to shale and bedrock. They are more shallow to bedrock than the Bedington soils. The Berks soils are well drained and free of mottles, but the Comly soils are moderately well drained and are mottled at a depth of 18 to 30 inches. The Berks soils are free of mottles, but the poorly drained Brinkerton soils are mottled near the surface.

Berks channery silt loam, 3 to 8 percent slopes, moderately eroded (BhB2).—This soil has a profile similar to the one described as typical for the series except that coarse fragments in the profile of this soil are more numerous and larger than in the typical and, in most places, are harder and darker colored. This soil has lower available moisture capacity than Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded, because it contains more coarse fragments and has less fine-textured soil material between the fragments.

Most areas of this soil are cultivated and are used for general farm crops. The main concerns in management are maintaining the organic-matter content in the surface layer and reducing erosion. Practices that control surface water are needed to retard runoff and to help maintain good growth of crops. (Capability unit IIe–4)

Berks channery silt loam, 8 to 15 percent slopes, moderately eroded (BhC2).—This soil has a profile similar to the one described as typical for the series, except that the profile of this soil has a thinner surface layer and contains more numerous hard, coarse fragments. This soil is more droughty than Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded, because it has less fine soil material in the subsoil to hold moisture for plant use.

Included with this soil in mapping are a few acres of woodland where erosion is only slight and the surface layer is thicker than that in the profile described as typical for the series.

Most areas of this soil are used for general farm crops, but some areas are used for pasture and as woodland. Practices that control surface water are needed to retard runoff and reduce erosion. (Capability unit IIIe–3)

Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded (BkB2).—This soil occurs on broad areas of the uplands. It has the profile described as typical for the series. Included with this soil in mapping are several areas that have slopes of less than 3 percent, a few severely eroded areas, and some slightly eroded areas.

Most areas of this soil have been cleared and are used for general farm crops. The main concerns in management are maintaining the organic-matter content in the surface layer and controlling erosion. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIe–4)

Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded (BkC2).—This soil generally occurs just above the short, steep banks that border the valleys or stream channels. It has a profile similar to the one described as typical for the series, except that the profile of this soil is more shallow to bedrock. Included with this soil in mapping are several small severely eroded areas.

Most areas of this soil have been cleared and are used for general farm crops. The main concerns in management are controlling erosion and maintaining fertility. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIIe–3)

Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded (BkD2)—This soil has rapid runoff. Its profile has a thinner surface layer than that in the profile described as typical for the series; otherwise the profiles are similar. Included with this soil in mapping are a few severely eroded areas. Also included is an area where the surface layer contains more channery material than shaly material. This soil generally is used for pasture or hay. The main management concerns are controlling runoff and maintaining fertility. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IVe–1)

Brecknock Series

The Brecknock series consists of deep, well-drained, gently sloping to moderately steep soils on the uplands south of Hershey. These soils are characterized by a medium-textured surface layer, a moderately fine textured subsoil, and fragments of porcelanite or shale throughout the profile. They formed in material weathered from dark-colored, noncalcareous shale and sandstone that metamorphosed as a result of contact with diabase dikes.

In a typical profile the surface layer is very dark grayish-brown channery silt loam about 8 inches thick. The subsoil extends to a depth of 35 inches and is dark grayish-brown and dark-brown channery clay loam. The underlying material is partly weathered, dark bluish-gray channery clay loam. Dark-gray porcelanite bedrock occurs at a depth of 48 inches or more.

The Brecknock soils have moderate permeability and available moisture capacity and medium internal drainage.

Brecknock soils are not extensive in Dauphin County, but most areas have been cleared and are used for general farm crops.

Typical profile of Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field, one-quarter mile west of Deodate:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) channery silt loam; moderate, fine, granular structure; friable when moist; 20 percent, by volume, is coarse fragments; neutral; clear, smooth boundary.

B21t—8 to 14 inches, dark grayish-brown (2.5Y 4/2) channery clay loam; weak, very thick, platy structure that breaks to weak, fine, subangular blocky; friable when moist, slightly sticky when wet; common patches of clay films on ped faces; 20 percent, by volume, is coarse fragments; slightly acid; gradual, wavy boundary.

B22t—14 to 21 inches, dark grayish-brown (10YR 4/2) channery clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common patches of clay film on ped faces; 20 percent, by volume, is coarse fragments; slightly acid; gradual, wavy boundary.

B23t—21 to 28 inches, dark grayish-brown (2.5Y 4/2) channery clay loam; moderate, medium, blocky structure; firm when moist, sticky and slightly plastic when wet; common, thin clay films and a few black coatings on ped faces; 20 percent, by volume, is coarse fragments; slightly acid; clear, wavy boundary.

B24t—28 to 35 inches, dark-brown (10YR 4/3) channery clay loam; strong, medium to coarse, blocky structure; firm when moist, sticky and plastic when wet; 25 percent, by volume, is coarse fragments; common patches of clay films on ped faces; medium acid; gradual, wavy boundary.

C—35 to 48 inches, dark bluish-gray (5B 4/1) channery clay loam; moderate, thick, platy structure; very firm when moist; 40 percent, by volume, is coarse fragments; strongly acid; clear, abrupt boundary.

R—48 inches +, dark-gray porcelanite bedrock.

The B horizon ranges from silt loam to clay loam and contains varying amounts of shale and channery fragments. The B horizon is dark brown or dark grayish brown. Thickness of the solum ranges from 2 to 3 feet, and depth to bedrock from 3½ to 5 feet.

The Brecknock soils are associated with the Neshaminy, Lehigh, and Croton soils. The Brecknock soils have a darker colored A horizon and B horizon than the Neshaminy soils, but both kinds of soils are deep and well drained. The B horizon of Brecknock soils is free of mottles, but the moderately well drained Lehigh soils have a seasonal high water table and are mottled in the B horizon. The Brecknock soils are well drained, but the Croton soils are poorly drained, have a high water table, and are mottled near the surface.

Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded (BrB2).—This soil occupies ridgetops. It has the profile described as typical for the series. Included with this soil in mapping are several small areas that have slopes of less than 3 percent and a surface layer slightly thicker than that described as typical. Also included are a few, small, severely eroded areas where the surface layer is thinner than described.

Most areas of this soil have been cleared and are used for general farm crops. The main management concerns are controlling erosion and maintaining organic-matter content in the surface layer. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIe–4)

Brecknock channery silt loam, 8 to 20 percent slopes, moderately eroded (BrC2).—This soil occupies convex areas on the uplands. It has a profile similar to the one described as typical for the series, except that the profile of this soil has a thinner surface layer. Included with this soil in mapping are a few, small areas that have slopes of more than 20 percent, that are severely eroded, and that have a thinner than normal surface layer.

Most areas of this soil have been cleared and are used for general farm crops and hay and pasture. The main management concerns are controlling erosion and maintaining organic-matter content in the surface layer. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIIe–3)

Brinkerton Series

The Brinkerton series consists of deep, poorly drained, nearly level to gently sloping soils in upland areas at the heads of streams and in seepage spots.

These soils mainly occur in areas of gray shale and sandstone between Harrisburg and Lebanon County. They also are in other areas scattered throughout Dauphin County. The Brinkerton soils formed partly in material that weathered from gray shale and sandstone and partly in colluvial material.

In a typical profile the surface layer, about 7 inches thick, is dark grayish-brown silt loam. The subsoil extends to a depth of 40 inches. Its upper part is dark grayish-brown silty clay loam mottled with grayish colors. The middle is gray silty clay loam mottled with yellowish colors. The lower part is gray, compact clay loam mottled with strong brown. The underlying material is yellowish-brown clay loam mottled with gray. Bedrock of gray shale and sandstone is at a depth of about 47 inches.

Brinkerton soils have slow permeability, slow surface drainage, and a high water table. Internal drainage is very slow because these soils are moderately fine textured and have a compact layer, or fragipan, in the subsoil. Available moisture capacity is moderate.

The native vegetation on these soils consists of mixed hardwood trees, such as red maple, aspen, and sycamore. Cleared areas are mainly used for pasture or hay.

In Dauphin County Brinkerton soils are mapped only with Armagh soils.

Typical profile of a Brinkerton silt loam that has a slope of 0 to 3 percent, 500 feet west of the American Legion Building on Mountain View Road:

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, medium, granular structure; friable when moist, slightly sticky when wet; strongly acid; clear, wavy boundary.

B21tg—7 to 10 inches, dark grayish-brown (2.5Y 4/2) silty clay loam that has few, fine, faint mottles of dark gray (5Y 4/1) and dark greenish gray (5GY 4/1); moderate, medium, blocky structure; friable when moist, sticky and slightly plastic when wet; thin, continuous clay films on ped faces; medium acid; clear, wavy boundary.

B22tg—10 to 13 inches, gray (N 6/0) silty clay loam that has medium, distinct mottles of strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6); moderate, medium, blocky structure; firm when moist, sticky and slightly plastic when wet; thin, continuous clay films on ped faces; strongly acid; gradual, wavy boundary.

B23tg—13 to 30 inches, gray (N 6/0) silty clay loam that has common, medium, distinct mottles of strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6); moderate, medium, prismatic structure that breaks to strong, medium, blocky; firm when moist, sticky and plastic when wet; thick, continuous, gray clay films on ped faces; strongly acid; gradual, wavy boundary.

Bxg—30 to 40 inches, gray (N 5/0) clay loam that has common, medium, distinct mottles of strong brown (7.5YR 5/8); moderate, medium to coarse, prismatic structure that breaks to moderate, thick, platy; firm when moist, sticky and plastic when wet; discontinuous clay films on ped faces; strongly acid; clear, irregular boundary.

C—40 to 47 inches, yellowish-brown (10YR 5/8) clay loam that has few, fine, faint mottles of gray (N 5/0); moderate, medium, subangular blocky structure; friable to firm when moist, slightly sticky when wet; strongly acid; clear, wavy boundary.

R—47 inches +, solid, gray shale and sandstone.

The B horizon ranges from clay loam to silty clay loam. Depth to bedrock ranges from 3½ to 6 feet or more.

Brinkerton soils are adjacent to the Berks and the Comly soils. The Brinkerton soils are not so well drained as the moderately well drained Comly or the well drained Berks soils. The Brinkerton soils are mottled nearer the surface than the Comly soils and are deeper to bedrock than the Berks soils, which are not mottled.

Brinkerton and Armagh silt loams, 0 to 3 percent slopes (BtA).—The management and use of these Brinkerton and Armagh soils are so similar that separating them on the soil map was impractical. These soils, therefore, were mapped together as an undifferentiated soil group. Some areas contain only one of these soils, and other areas contain both. These soils are nearly level. Erosion is slight. Included with these soils in mapping are a few areas where the profile is thinner than that described as typical for the Brinkerton or the Armagh series.

Most areas of these soils have been cleared and are used for hay or pasture, but several areas are woodland. Practices that dispose of surface water are helpful in removing excess water. (Capability unit IVw–1)

Brinkerton and Armagh silt loams, 3 to 8 percent slopes, moderately eroded (BtB2).—These soils are more shallow to bedrock than is typical for either series. Runoff is medium. Included with these soils in mapping are a few small areas that have slopes of more than 8 percent. Also included are several small areas that are not eroded and, in these areas, the soil is deeper to bedrock than are these soils. Most areas of this mapping unit are used for hay or pasture. The main management concern is wetness. Water disposal practices are needed to remove excess water from these soils. (Capability unit IVw–1)

Buchanan Series

The Buchanan series consists of deep, nearly level to sloping soils that are moderately well drained. These soils occupy the lower mountain slopes in the northern half of Dauphin County. They formed in colluvial material that was derived mainly from acid shale and sandstone.

In a typical profile 2 inches of twigs, leaves, and leaf litter cover the surface layer. The surface layer is light brownish-gray very stony loam about 6 inches thick. The subsoil is light yellowish-brown channery loam and channery clay loam to a depth of 15 inches. To a depth of 46 inches, the subsoil is compact, yellowish-brown channery sandy loam and brownish-yellow clay loam that are mottled with grayish colors. The underlying material is reddish-brown sandy clay loam. Bedrock of shale and sandstone is at a depth of 50 inches.

In the Buchanan soils permeability is slow. Runoff is medium, but internal drainage is restricted by the compact lower part of the subsoil.

Native vegetation on these soils consisted of hardwoods and a few scattered pines and hemlock. These soils generally are used for pasture and hay, but some areas are cropped.

Typical profile of Buchanan very stony loam, 0 to 8 percent slopes, 1.5 miles northwest of Berrysburg:

O1—2 inches to 1 inch, undecomposed oak and poplar leaves and twigs; clear, smooth boundary.

O2—1 inch to 0, gray (10YR 6/1) decomposed leaf litter; extremely acid; abrupt, smooth boundary.

A1—0 to 6 inches, light brownish-gray (10YR 6/2) very stony loam; weak, fine, subangular blocky structure; friable when moist; 15 to 20 percent, by volume, is coarse fragments; very strongly acid; gradual, wavy boundary.

B21t—6 to 11 inches, light yellowish-brown (10YR 6/4) channery loam; weak to moderate, medium, subangular blocky structure; friable when moist; thin, discontinuous clay films on ped faces; 20 percent, by volume, is coarse fragments; slightly sticky when wet; very strongly acid; gradual, wavy boundary.

B22t—11 to 15 inches, light yellowish-brown (10YR 6/4) channery clay loam; moderate, medium, subangular blocky structure; friable when moist; thin clay films on ped faces; 20 percent, by volume, is coarse fragments; slightly sticky when wet; very strongly acid; gradual, wavy boundary.

Bx1—15 to 27 inches, yellowish-brown (10YR 5/6) channery sandy loam that has common, fine, distinct mottles of grayish brown (10YR 5/2); moderate, medium, platy structure; brittle and firm when moist; thin clay films on ped faces; 30 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

Bx2—27 to 46 inches, brownish-yellow (10YR 6/8) channery clay loam that has common, medium, distinct mottles of gray (5Y 5/1); moderate, medium and coarse, prismatic structure; brittle; firm when moist, sticky and slightly plastic when wet; 20 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

IIC—46 to 50 inches, reddish-brown (5YR 4/3) sandy clay loam; moderate, coarse, blocky structure; very firm when moist, sticky when wet; very strongly acid; abrupt, wavy boundary.

R—50 inches +, shale and sandstone bedrock.

The A horizon ranges from gravelly loam to very stony loam. The B2t horizon ranges from channery sandy loam to channery clay loam. Depth to the Bx1 horizon ranges from 15 to 30 inches. Thickness of the fragipan ranges from 10 to 31 inches. The percentage of coarse fragments above the IIC horizon ranges from 15 to 40 percent, by volume.

The Buchanan soils are adjacent to the Laidig and Andover soils. The Buchanan soils are moderately well drained and are mottled at depths between 15 and 36 inches, but the Laidig soils are well drained and lack mottles to a depth of 36 inches. The Buchanan soils are not so gray as the poorly drained Andover soils, which are mottled at or near the surface.

Buchanan gravelly loam, 3 to 8 percent slopes (BuB).—This soil mostly occurs at the base of steep slopes. It has a profile similar to the one described as typical for the series, except that this soil has a thinner surface layer and stones are not on the surface. Cleared areas generally are cultivated or used for pasture or hay. Several areas are wooded. The main management concerns are controlling erosion and maintaining organic-matter content in the surface layer. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIe–5)

Buchanan very stony loam, 0 to 8 percent slopes (BvB).—This soil has the profile described as typical for the series. This soil is wooded and occupies the lower slopes of low mountains. Good practices of woodland management are needed to maintain good growth of trees. (Capability unit VIs–1)

Calvin Series

The Calvin series consists of moderately deep, well-drained soils on uplands in the northern half of the county. Calvin soils are nearly level to steep (fig. 5). These soils formed in materials weathered from acid red shale and sandstone.

In a typical profile the surface layer is dark reddish-brown shaly silt loam about 9 inches thick. The subsoil is reddish-brown and dark reddish-brown shaly silt loam in the upper part and dusky red very shaly silt loam in the lower part. Red shale bedrock occurs at a depth of about 27 inches.

The Calvin soils have moderate permeability and moderate to low available moisture capacity.

The native vegetation of Calvin soils consisted of mixed hardwoods. Most areas have been cleared and are used for general farm crops.

Typical profile of a Calvin shaly silt loam that has a slope of 3 to 8 percent and is moderately eroded, in an alfalfa field about 1 mile northeast of Millersburg (Laboratory No. S64–Pa–22–3–1–4):

Ap—0 to 9 inches, dark reddish-brown (5YR 4/3) shaly silt loam; weak, fine, granular structure; friable when moist, slightly sticky and nonplastic when wet; 36 percent, by volume, is coarse fragments; slightly acid; abrupt, smooth boundary.

B21—9 to 15 inches, reddish-brown (2.5YR 4/4) shaly silt loam; weak, fine and medium, subangular blocky structure; thin silt films on peds; friable when moist, slightly sticky and slightly plastic when wet; 43 percent, by volume, is coarse fragments; slightly acid; clear, wavy boundary.

B22—15 to 21 inches, dark reddish-brown (2.5YR 3/4) shaly silt loam; weak, medium, subangular blocky structure; medium silt films on peds; friable when moist, slightly sticky and slightly plastic when wet; 40 percent, by volume, is coarse fragments; strongly acid; clear, wavy boundary.

B3—21 to 27 inches, dusky red (10R 3/4) very shaly silt loam; structure modified by shale; thick silt films on shale surfaces; friable to firm when moist, sticky and slightly plastic when wet; 65 percent, by volume, is coarse fragments; very strongly acid; abrupt, irregular boundary.

R—27 inches +, dusky red (10R 3/3) shale; clay films on shale surfaces.

The Ap horizon ranges from shaly silt loam to silt loam. The B21 and B22 horizons are 20 to 50 percent coarse fragments. Depth to bedrock ranges from 2 to 3½ feet. In the R horizon silt and clay films are on the vertical faces of the shale and are as much as a quarter inch thick in places.

In many places the Calvin soils are adjacent to Klinesville and Albrights soils. Calvin soils have a thicker solum than Klinesville soils and are deeper to bedrock. Calvin soils are well drained and are free of mottling, but Albrights soils are moderately well drained and are mottled between depths of 17 and 36 inches.

Calvin very stony silt loam, 0 to 8 percent slopes (CaB).—Except for fewer shale fragments in the surface layer and many stones on the surface and throughout all layers, this soil has a profile similar to that described as typical for the series. The numerous stones and boulders on the surface restrict use to woodland. (Capability unit VIs–1)

Calvin very stony silt loam, 8 to 25 pecent slopes (CaD).—This soil occurs high on the sides of steep mountains. It is only slightly eroded and has numerous stones scattered on the surface and throughout

Figure 5.—Typical area of a Calvin shaly silt loam in cleared fields. Dekalb and Lehew soils on ridges in background.

all layers. Otherwise, its profile is similar to that described as typical for the series. This soil is suited to trees and should remain forested. Management practices are needed that help to control erosion and to insure good growth of trees. (Capability VIIs–1)

Calvin very stony silt loam, 25 to 75 percent slopes (CaF).—This soil is only slightly eroded, though it is steep and very steep. It has many stones on the surface and throughout the profile, but shale fragments are fewer than in the profile described as typical for the series. This soil is too steep and stony for cultivation, and all of it has remained wooded. Management practices that insure good growth of trees are needed. (Capability unit VIIs 1)

Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded (CkC2).—These soils occur together in such an intricate pattern that they cannot be shown separately on the soil map. The Calvin soil has a profile similar to the one described as typical for its series. The profile of the Klinesville soil is the one described as typical for its series. Klinesville soils occur in the steeper areas. In most areas about 75 percent of this complex is Calvin soil, and about 25 percent is Klinesville soil. The proportion of each soil in the complex, however, varies with the slope.

Included with this complex in mapping are a few, small, wooded areas that have only slight or no erosion. Also included are several severely eroded areas that have lost more than 75 percent of the original surface layer.

The main difference between the Calvin and Klinesville soils in this complex is depth to solid shale. This depth ranges from 24 to 40 inches in the Calvin soil and from 12 to 20 inches in the Klinesville soil. Both

soils, however, have considerable amounts of reddish-brown shale fragments in the surface layer and subsoil. Although the available moisture capacity in the complex generally is low to moderate, the Calvin soil holds more moisture available to plants. This is because the Calvin soil is thicker and has a deeper rooting zone. Both soils require intensive management for good growth of plants.

The main management practices needed on these soils are those that control erosion and that maintain organic-matter content in the surface layer. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IVe–1)

Calvin-Klinesville shaly silt loams, 15 to 25 percent slopes, moderately eroded (CkD2).—This complex is similar to Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded. About 55 percent of the complex is Calvin soil, and about 45 percent is Klinesville soil. Except that each soil has a thinner surface layer, the profile of each is similar to the one described as typical for its respective series.

Included with these soils in mapping are a few wooded tracts that are only slightly eroded.

The use of these soils is limited to pasture or woodland by the steep slopes. Maintaining organic-matter content and controlling erosion are the main concerns in management. Practices are needed that improve pasture and control surface water so that runoff is reduced. (Capability unit VIe–1)

Calvin-Leck Kill shaly silt loams, 0 to 3 percent slopes (ClA).—These soils occur extensively near Elizabethville, Berrysburg, and Gratz. They occupy ridgetops and broad uplands. Most areas are about 50 percent Calvin soil and about 50 percent Leck Kill soil, but the proportion of each soil in the complex varies from place to place. The soils are so intermingled that they cannot be shown separately on the soil map. Each soil has a profile similar to that described as typical for its respective series.

Included in this complex in mapping are several small areas of a soil that has a thicker profile than the Calvin or the Leck Kill soil.

The main difference between these two soils is that the percentage of silt and clay in the subsoil of the Leck Kill soil is higher than that in the subsoil of the Calvin soil. Because the Leck Kill soil is deeper to shale, has a deeper rooting zone, and has finer material in the subsoil, it has more moisture available for good growth of plants.

Nearly all areas of this complex have been cleared and are used for general farm crops. Where slopes are long, practices for controlling surface water are needed to help control sheet erosion. (Capability unit IIe–4)

Calvin-Leck Kill shaly silt loams, 3 to 8 percent slopes, moderately eroded (ClB2).—These soils occur near the tops of upland ridges. The Calvin soil and the Leck Kill soil each has a profile like that described as typical for its series. This complex makes up about 12 percent of the county. About 60 percent of it is Calvin soil, and about 40 percent is the Leck Kill soil.

Included in this complex in mapping are several areas of a soil that is deeper to bedrock and finer textured than the Calvin and Leck Kill soils. These included areas are just above the flood plain or near the bottom of hills where colluvium has been deposited. Also included are several small severely eroded areas. Other inclusions are of a soil in which shale fragments make up a higher percentage of the subsoil than the percentage in the subsoil of the Calvin or Leck Kill soils.

Most areas of this extensive complex are cleared and used for general farm crops. The main management concerns are controlling erosion and maintaining organic-matter content. Practices that control surface water are needed to reduce runoff and to help maintain good growth of crops. (Capability unit IIe–4)

Calvin-Leck Kill shaly silt loams, 8 to 15 percent slopes, moderately eroded (ClC2).—This complex occurs in hilly areas. About 70 percent of the complex is Calvin soil, and about 30 percent is Leck Kill soil. Except that these soils have a thin surface layer, each soil has a profile similar to the one described as typical for its series.

Included with this complex in mapping are several small severely eroded areas that have slopes of more than 15 percent. Also included, near the bottom of the steeper slopes where colluvium has accumulated, are areas of a soil that is deeper to bedrock than the Calvin or the Leck Kill soil.

Most of this complex has been cleared and is used for general farming. The major concerns in management are controlling erosion and maintaining the organic-matter content. Practices are needed that control surface water and reduce runoff and that maintain good growth of crops. (Capability unit IIIe–3)

Captina Series

The Captina series consists of gently sloping, moderately well drained soils on terraces. These soils are mainly along Swatara and Conewago Creeks in the southern part of the county. A few areas are along the Susquehanna River. Captina soils formed in sediments washed from acid shale and sandstone.

In a typical profile the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil is yellowish-brown silt loam and brownish-yellow silty clay loam to a depth of 20 inches, and below that depth is compact and brittle brownish-yellow loam (fragipan) that is mottled with pale brown. The subsoil is underlain by strong-brown gravelly loam mottled with gray, and that, in turn, by partly weathered shale fragments at a depth of 48 inches.

The surface layer of Captina soils is moderately permeable, and the subsoil is slowly permeable. Internal drainage is impeded by the fragipan. Available moisture capacity is moderate.

The native vegetation on these soils consisted of mixed hardwoods. Most areas have been cleared and are used for general farm crops.

Typical profile of Captina silt loam, 3 to 8 percent slopes, eroded, about 2 miles north of Hershey and one-quarter mile south of Swatara Creek:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist; neutral (limed); clear, wavy boundary.

B21t—9 to 15 inches, yellowish-brown (10YR 5/4) silt loam; moderate, medium, subangular blocky structure; friable to firm when moist, slightly sticky when wet; thin clay films on ped faces; neutral; gradual, wavy boundary.

B22t—15 to 20 inches, brownish-yellow (10YR 6/6) silty clay loam; moderate, medium, subangular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; thin clay films on ped faces: 10 percent, by volume, is coarse fragments; slightly acid; gradual, irregular boundary.

Bx—20 to 34 inches, brownish-yellow (10YR 6/8) loam that has common, medium, distinct mottles of pale brown (10YR 6/3); moderate, very thick, platy structure that breaks to moderate, fine, subangular blocky; very firm when moist, slightly sticky when wet; discontinuous clay films and black coatings on some ped faces; 15 percent, by volume, is coarse fragments; medium acid; gradual, irregular boundary.

C1—34 to 48 inches, strong-brown (7.5YR 5/8) gravelly loam that has common, medium, distinct mottles of gray (10YR 6/1); moderate, medium, subangular blocky structure; friable when moist; 25 percent, by volume, is coarse gravel; extremely acid; gradual, irregular boundary.

C2—48 inches +, partly weathered shale fragments.

The B horizon ranges from yellowish brown (10YR 5/4) to strong brown (7YR 5/8). In some places this horizon is stratified with sand, silt, and round pebbles. The B2t horizon ranges from loam to silty clay loam. The Bx horizon is at a depth ranging from 18 to 36 inches and is 8 to 20 inches thick. The C2 horizon grades to shale bedrock at a depth below 6 feet.

Captina silt loam, 3 to 8 percent slopes, moderately eroded (CmB2).—This soil occurs on terraces along Swatara Creek and the Susquehanna River. Included with this soil in mapping are several small areas of a well-drained soil that is free of mottles to a depth of 36 inches. Also included are a few areas where the slopes are less than 3 percent and the profile is thicker than that described as typical for the series.

This soil is mostly cultivated. It is adapted to all general farm crops except those that are deep rooted. The main concerns in management are maintaining the organic-matter content, controlling erosion, and removing excess water from the subsoil. Practices that control surface water help to reduce erosion by retarding runoff. Practices are needed that remove excess water from the subsoil. (Capability unit IIe–5)

Chavies Series

The Chavies series consists of deep, nearly level to sloping, well-drained soils on terraces along the Susquehanna River. These soils formed in alluvium washed mainly from areas of sandstone and shale.

In a typical profile the plow layer is dark-brown fine sandy loam about 9 inches thick. The next layer is about 3 inches of dark-brown fine sandy loam. The subsoil is reddish-brown sandy loam and fine sandy loam. It extends to a depth of 28 inches and is underlain by loamy and sandy material that contains gravel. The gravel increases with depth.

The Chavies soils have moderately rapid permeability and medium internal drainage. These soils are neutral to very strongly acid.

The native vegetation on these soils consisted mostly of hardwoods. Where Chavies soils have been cleared, they are used for general farm crops and vegetables.

Typical profile of Chavies fine sandy loam, 0 to 3 percent slopes, on Haldeman Island north of Clarks Ferry bridge (Laboratory No. S64–Pa–22–2–1–13):

Ap—0 to 9 inches, dark-brown (10YR 3/3) fine sandy loam that contains, by volume, less than 1 percent gravel; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; slightly acid; abrupt, irregular boundary.

A&B—9 to 12 inches, dark-brown (7.5YR 4/4) fine sandy loam; weak, thin and medium, platy structure; firm when moist, slightly sticky and nonplastic when wet; less than 1 percent gravel by volume; neutral; clear, broken boundary.

B21t—12 to 19 inches, reddish-brown (5YR 4/4) fine sandy loam; weak, medium, subangular blocky structure; clay bridging across sand grains; friable when moist, slightly sticky and nonplastic when wet; less than 1 percent gravel by volume; slightly acid; gradual, wavy boundary.

B22t—19 to 24 inches, reddish-brown (5YR 4/4) fine sandy loam; weak, medium, prismatic structure that breaks to weak, medium, subangular blocky; clay bridging across sand grains; friable when moist, slightly sticky and nonplastic when wet; less than 1 percent gravel, by volume; strongly acid; clear, wavy boundary.

B23t—24 to 28 inches, reddish-brown (5YR 4/4) sandy loam; weak, medium, subangular blocky structure; clay bridging across sand grains; friable when moist, nonsticky and nonplastic when wet; less than 1 percent gravel, by volume; strongly acid; clear, wavy boundary.

C1—28 to 33 inches, reddish-brown (7.5YR 4/4) loamy sand that has bands of sandy loam; massive; clay bridging across sand grains in bands; friable when moist, nonsticky and nonplastic when wet; less than 1 percent gravel, by volume; strongly acid; clear, wavy boundary.

C2—33 to 39 inches, dark yellowish-brown (10YR 4/4) loamy sand that has a few bands of sandy loam; massive; clay bridging across sand grains in bands; very friable when moist, nonsticky and nonplastic when wet; less than 1 percent gravel, by volume; very strongly acid; clear, wavy boundary.

C3—39 to 43 inches, dark-brown (7.5YR 4/3) sandy loam that has brown (7.5YR 5/2) bands of loamy sand; weak, medium, subangular blocky structure; clay bridging across sand grains in bands; friable when moist, nonsticky and nonplastic when wet; less than 1 percent gravel, by volume; very strongly acid; clear, wavy boundary.

C4—43 to 49 inches, dark yellowish-brown (10YR 4/4) loamy sand that has sandy loam bands; very weak, medium, subangular blocky structure; friable when moist; some clay films on ped faces; less than 1 percent gravel, by volume; very strongly acid; clear, wavy boundary.

C5—49 to 61 inches, dark grayish-brown loamy fine sand that has dark reddish brown (5YR 3/4) bands of fine sandy loam; single grain; friable when moist, bands slightly sticky when wet; some clay bridging across sand grains; less than 5 percent coarse fragments, by volume; very strongly acid; clear, wavy boundary.

C6—61 to 66 inches, dark reddish-gray (5YR 4/2) loamy fine sand that has silt lenses and gravelly loam lenses; massive; friable when moist, nonsticky and nonplastic when wet; some clay films in pores; less than 5 percent coarse fragments, by volume; very strongly acid; clear, wavy boundary.

IIC7—66 to 78 inches, grayish-brown (10YR 5/2), reddish-brown (5YR 4/4), and dark-brown (7.5YR 4/4), stratified very fine sand, silt, and gravel; weak, thick, platy structure; very friable when moist,

nonsticky and nonplastic when wet; gravel is 15 percent of the horizon, by volume; very strongly acid; clear, wavy boundary.

IIC8—78 to 84 inches, brown (10YR 5/3) very gravelly loamy sand; single grain; loose when moist, nonsticky and nonplastic when wet; silt coatings and clay films on gravel; 80 percent gravel, by volume; very strongly acid.

The B horizon generally contains a few waterworn pebbles. Depth to gravel and coarse sand ranges from 3 to 8 feet.

The Chavies soils are associated with the Tioga soils, which are on flood plains in some places and on high bottoms in others. Chavies soils have clay bridging sand grains in the subsoil, but the Tioga soils on flood plains or high bottoms lack clay bridging and are more shallow to coarse sand and gravel.

Chavies fine sandy loam, 0 to 3 percent slopes (CnA).—This soil is on stream terraces that have slow runoff. It has the profile described as typical for the series. Included with this soil in mapping are several small areas that have a thinner, more gravelly surface layer than that described as typical. Also included are a few areas, about 14 acres, that have a silt loam surface layer. Most areas of this soil have been cleared and are used for general farm crops or pasture. The main management concern is maintaining organic-matter content. (Capability unit IIs-1)

Chavies fine sandy loam, 3 to 8 percent slopes, moderately eroded (CnB2).—This soil is along the Susquehanna River on terraces that have medium runoff. Except that it is thinner to loamy sand, the profile of this soil is similar to the one described as typical for the series. Included with this soil in mapping are several areas that have a gravelly sandy loam or silt loam surface layer.

Cleared areas of this soil are used for general farm crops. The main management concerns are controlling erosion and maintaining organic-matter content. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIe–2)

Chavies fine sandy loam, 8 to 15 percent slopes, moderately eroded (CnC2).—This soil is on escarpments. Except that it is thinner, the profile of this soil is similar to the one described as typical for the series. Included with this soil in mapping are several areas that have a gravelly sandy loam surface layer. A few other included areas have slopes of more than 15 percent and are severely eroded.

Most areas of this soil have been cleared and are used for general farm crops. The main management concerns are controlling erosion and maintaining the organic-matter content in the surface layer. Practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIIe–4)

Comly Series

The Comly series consists of deep, nearly level to gently sloping, moderately well drained soils on uplands. These soils occupy areas east of Harrisburg and south of the Blue Mountain. They formed in areas around the head of streams, in colluvium at the base of slopes, and in seepage areas that are underlain by gray shale and sandstone.

In a typical profile the plow layer, about 9 inches thick, is dark grayish-brown silt loam that contains a few coarse fragments. It is underlain by 4 inches of yellowish-brown silt loam that also contains a few coarse fragments. The subsoil is yellowish-brown and light yellowish-brown silt loam to a depth of 23 inches and below that depth is dense and compact, yellowish-brown shaly loam and very shaly loam (fragipan). Coarse fragments occur in the subsoil and increase with depth. Soft shale is at a depth of 44 inches.

The Comly soils have moderately slow permeability and a seasonal high water table.

The native vegetation on these soils consisted of hardwoods. Most areas have been cleared and are used for tilled crops and hay and pasture.

Typical profile of Comly silt loam, 2 to 8 percent slopes, moderately eroded, in an idle field south of U.S. Highway No. 22 at Skyline View (Laboratory No. S64–Pa–22–9–1–8):

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure that grades to weak, thin, platy in lower part; friable when moist, nonsticky and nonplastic when wet; 1 percent, by volume, is coarse fragments; neutral; abrupt, wavy boundary.

A3—9 to 13 inches, yellowish-brown (10YR 5/6) silt loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; 1 percent, by volume, is coarse fragments; neutral; clear, wavy boundary.

B21t—13 to 18 inches, yellowish-brown (10YR 5/6) silt loam; weak, medium, prismatic structure that breaks to moderate, medium, subangular blocky; friable when moist, slightly sticky and plastic when wet; thin, patchy clay films on ped faces; 2 percent, by volume, is coarse fragments; neutral; gradual, wavy boundary.

B22t—18 to 23 inches, yellowish-brown (10YR 5/4) to light yellowish-brown (10YR 6/4) heavy silt loam that has common, medium, distinct mottles of strong brown (7.5YR 5/6); weak, medium, prismatic structure that breaks to moderate, medium, blocky; friable when moist, slightly sticky and plastic when wet; thin clay films in pores and in patches on ped faces; 2 percent, by volume, is coarse fragments; neutral; abrupt, wavy boundary.

Bx1—23 to 30 inches, yellowish-brown (10YR 5/4) shaly loam that has many, fine, prominent mottles of dark brown (10YR 4/3), light brownish gray (10YR 6/2), and yellowish brown (10YR 5/6, 5/8); strong, very coarse, prismatic structure that breaks to moderate, medium and thin, platy; firm when moist, slightly sticky and slightly plastic when wet; medium silt and clay films of gray (5YR 6/1) on ped faces, thick in pores; 15 percent, by volume, is coarse fragments; slightly acid; clear, wavy boundary.

Bx2—30 to 34 inches, yellowish-brown (10YR 5/6) to light yellowish-brown (10YR 6/4) shaly loam that has many, fine to medium, prominent mottles of light yellowish brown (2.5YR 6/4) and strong brown (7.5YR 5/6); strong, very coarse, prismatic structure that breaks to moderate, thin and medium, platy; very firm when moist, slightly sticky and slightly plastic when wet; many manganese and iron coatings and continuous clay films on ped faces; 15 percent, by volume, is coarse fragments; strongly acid; clear, wavy boundary.

Bx3—34 to 44 inches, yellowish-brown (10YR 5/8) very shaly loam that has many, fine and medium, prominent mottles of pale olive (5Y 6/3); strong, very coarse, prismatic structure that breaks to moderate, thin and medium, platy; very firm when moist, sticky and nonplastic when wet; many manganese

and iron coatings and continuous silt and clay films on ped faces; 65 percent, by volume, is coarse fragments; medium acid; abrupt, wavy boundary.

R—44 to 52 inches +, light olive-brown (2.5Y 5/4), medium acid, soft shale.

Depth to mottling ranges from 18 to 30 inches. Depth to bedrock ranges from 3½ to 5 feet.

The Comly soils are associated with the Bedington, Berks, and Brinkerton soils. The Comly soils are moderately well drained and have a fragipan and mottles in the B horizon, but the Bedington and the Berks soils are well drained, do not have a fragipan, and are free of mottles. The Comly soils are not so deep to bedrock as the Bedington soils but are deeper to bedrock than the Berks soils. The Comly soils do not have mottles above a depth of 18 inches and are better drained than the Brinkerton soils, which are poorly drained and have mottles near or at the surface.

Comly silt loam, 2 to 8 percent slopes, moderately eroded (CoB2).—This soil is on the uplands. Included with it in mapping are several small areas of a soil that has slopes of more than 8 percent and has a profile more shallow to bedrock than that described as typical for the series. Also included are a few areas of a slightly eroded soil that has a profile deeper to bedrock than that described as typical for the series. The main management concern on this Comly soil is the seasonal high water table. Practices that remove both surface and internal water are needed during the wet season. (Capability unit IIe–5)

Croton Series

The Croton series consists of deep, nearly level to gently sloping, poorly drained soils on uplands. These soils formed in material weathered from Triassic red shale and sandstone. They are in the southern part of Dauphin County and in a few places scattered throughout other parts. These soils are in depressions in some places.

In a typical profile the surface layer is dark-gray silt loam about 8 inches thick. The subsoil, to a depth of 18 inches, is grayish-brown silt loam and light brownish-gray clay loam and is mottled with yellowish brown. Below this to a depth of 42 inches, the subsoil is dense and compact (fragipan) and consists of dark reddish-gray clay loam mottled with light brown and gray. This is underlain by bedrock of red shale and sandstone.

The Croton soils have slow permeability and are waterlogged for long periods. These soils are strongly acid if not limed and are low in bases.

Croton soils are not extensive in Dauphin County and are not important to farming. They are used mostly for pasture or hay.

Typical profile of Croton silt loam in a pasture field along State Route 743, about 4 miles southwest of Hershey:

Ap—0 to 8 inches, dark-gray (10YR 4/1) silt loam; weak, fine, granular structure; friable when moist; slightly acid; clear, smooth boundary.

B21tg—8 to 12 inches, grayish-brown (10YR 5/2) silt loam that has few, fine, faint mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable when moist; thin clay films on ped faces; medium acid; clear, wavy boundary.

B22tg—12 to 18 inches, light brownish-gray (10YR 6/2) clay loam that has common, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; common patches of clay films on ped faces; medium acid; clear, wavy boundary.

Bx1g—18 to 42 inches, dark reddish-gray (5YR 4/2) clay loam that has common, medium, distinct mottles of light brown (7.5YR 6/4) and gray (5YR 6/1); coarse prismatic structure that breaks to moderate, thick, platy; firm and brittle when moist, slightly sticky when wet; common patches of clay films on ped faces; strongly acid; gradual, wavy boundary.

R—42 inches +, red shale and sandstone bedrock.

The Ap horizon ranges from 8 to 10 inches in thickness. The B horizon ranges from clay loam to silt loam. Depth to the fragipan ranges from 15 to 25 inches. In some places coarse fragments occur in lower parts of the B horizon. Bedrock generally occurs at a depth greater than 3½ feet.

The Croton soils are near the Readington and Penn soils. The Croton soils have a high water table and are mottled near the surface, but the Readington soils are moderately well drained and typically are mottled at depths between 15 and 42 inches. The Croton and the Readington soils both have a fragipan, but the Penn soils do not and are free of mottles.

Croton silt loam (Cr).—This soil occurs in nearly level, low areas and in depressions where erosion is slight. Slopes range from 0 to 5 percent. The soil is fairly well suited to hay and pasture. Small areas in cultivated fields generally are farmed the same as are the surrounding soils. Wetness is the main management concern. Practices that remove surface water are needed. (Capability unit IVw–1)

Dekalb Series

The Dekalb series consists of moderately deep, nearly level to very steep soils that are well drained. These soils formed in material weathered from gray sandstone.

On the surface of a typical profile is 2 inches of hardwood leaves and twigs, some partly decomposed. The surface mineral layer is about 2 inches thick and consists of dark-gray stony sandy loam. Below this is a layer, about 5 inches thick, of grayish-brown very stony sandy loam. The next layer, about 3 inches thick, is yellowish-brown channery sandy loam. The subsoil extends to a depth of about 26 inches and is light olive-brown channery sandy loam that is 35 to 40 percent sandstone fragments, by volume. The underlying material is brown very channery sandy loam that is 75 percent coarse fragments by volume. Gray sandstone bedrock is at a depth of about 33 inches. Small stones and boulders are on the surface and throughout the profile.

Dekalb soils have moderately rapid permeability and low available moisture capacity. They are very strongly acid and are low in clay content.

Most areas of these soils are wooded. Areas that have been cleared of trees and stones are used for pasture and hay.

Typical profile of Dekalb very stony sandy loam that has a slope of 8 to 25 percent, in a wooded area on top of Short Mountain:

O1—2 to 1½ inches, leaves and twigs recently fallen from hardwoods.

O2—1½ inches to 0, very dark-gray (10YR 3/1) partly decomposed organic matter; extremely acid; abrupt, smooth boundary.
A1—0 to 2 inches, dark-gray (N 4/0) stony sandy loam; weak, fine, granular structure; very friable when moist; many fine roots; 20 percent, by volume, is sandstone fragments; very strongly acid; abrupt, wavy boundary.
A2—2 to 7 inches, grayish-brown (2.5Y 5/2) stony sandy loam; weak, fine, granular structure; friable; many fine roots; 20 percent, by volume, is sandstone fragments; very strongly acid; clear, wavy boundary.
A3—7 to 10 inches, yellowish-brown (10YR 5/4) channery sandy loam; weak, fine and medium, granular structure; friable when moist, nonsticky and nonplastic when wet; few roots; 25 percent, by volume, is coarse sandstone fragments; very strongly acid; gradual, wavy boundary.
B21—10 to 20 inches, light olive-brown (2.5Y 5/4) channery sandy loam; weak, fine and medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; few roots; 35 percent, by volume, is sandstone fragments; very strongly acid; gradual, wavy boundary.
B22—20 to 26 inches, light olive-brown (2.5Y 5/6) channery sandy loam; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; occasional roots; 40 percent, by volume, is sandstone fragments; very strongly acid; clear, wavy boundary.
C—26 to 33 inches, brown (10YR 5/3) very channery sandy loam; massive; firm when moist, nonsticky and nonplastic when wet; 75 percent, by volume, is sandstone fragments; very strongly acid; gradual, irregular boundary.
R—33 inches +, gray sandstone bedrock.

The content of sandstone fragments, by volume, in the A1 and A2 horizons ranges from 15 to 25 percent, and in the B22 horizon from 35 to 80 percent. These pieces of sandstone range from gravel to boulders. Depth to bedrock ranges from 30 to 42 inches.

The Dekalb soils are associated with the Lehew, Laidig, and Buchanan soils. Although the Dekalb soils are similar to the Lehew soils in depth to bedrock, in texture, and in drainage, the two kinds of soils differ in origin. The Dekalb soils formed in material weathered from gray sandstone, but the Lehew soils formed in material weathered from red or reddish-gray sandstone. The Dekalb soils are free of mottles, lack a fragipan, and are not so deep to bedrock as the Buchanan soils. Unlike the Dekalb soils, the Buchanan soils typically have mottles between depths of 15 and 46 inches and have a fragipan. The Dekalb soils are not so deep to bedrock as the Laidig soils, but both kinds of soils are free of mottles.

Dekalb channery sandy loam, 3 to 8 percent slopes, moderately eroded (DcB2).—This soil is in the northern part of the county. It occupies ridgetops and side slopes where gray sandstone is exposed. It has lost most of the original surface layer through erosion, and only a few stones are on the surface. Otherwise, it has a profile similar to the one described as typical for the series. Most areas of this soil are cultivated and are used for general farm crops. Management practices that control surface water are needed to reduce runoff and erosion so that good growth of crops is maintained. (Capability unit IIe–4)

Dekalb channery sandy loam, 8 to 15 percent slopes, moderately eroded (DcC2).—This soil is hilly. It has lost 25 to 75 percent of the original surface layer; otherwise, it has a profile similar to the one described as typical for the series. Included with this soil in mapping are a few wooded areas that are only slightly eroded. Also included are several severely eroded areas that have slopes of more than 15 percent.

Most areas of this soil are cultivated, and a few are used for pasture and trees. The main management concerns are controlling erosion and maintaining the organic-matter content in the surface layer. Practices that control surface water are needed to reduce erosion by slowing runoff and allowing the water to soak into the soil. (Capability unit IIIe–5)

Dekalb and Lehew very stony sandy loams, 0 to 8 percent slopes (DlB).—These soils occur in the northern half of the county. They are on high ridges and in saddles and on terraces between steep slopes. The Dekalb soil and the Lehew soil each has a profile similar to the one described as typical for its series. In most areas the Dekalb soil has the larger acreage, though the acreage of the Lehew soil may be sizable. In some areas only one soil occurs. The main difference between the dark-gray Dekalb soil and the dark reddish-brown Lehew soil is in color. These soils have not been cleared and are well suited to their present use as woodland. Good practices of woodland management help to maintain rapid growth of high-quality trees. (Capability unit VIs–1)

Dekalb and Lehew very stony sandy loams, 8 to 25 percent slopes (DlD).—These soils are in the northern half of Dauphin County. Each kind of soil has the profile described as typical for its series. In most areas the Dekalb soil generally has the larger acreage, though the acreage of the Lehew soil may be sizable. In some areas only one soil occurs. The main difference between the dark-gray Dekalb soil and the dark reddish-brown Lehew soil is in color. These soils are too stony for crops or pasture but are suitable for trees. Runoff and erosion are not serious hazards on these soils. (Capability unit VIs–1)

Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes (DlF).—These soils occupy the lower parts of sandstone ridges in the northern part of the county. In most areas the Dekalb soil generally has the larger acreage, though the acreage of the Lehew soil may be sizable. In some areas only one soil occurs. The main difference between the dark-gray Dekalb soil and the dark reddish-brown Lehew soil is in color. These soils are too steep and stony for crops or pasture. Trees are the main cover, and they normally are of poor quality. (Capability unit VIIs–1)

Duffield Series

The Duffield series consists of deep, gently sloping, well-drained soils on uplands. These soils mostly occur east of Harrisburg near Steelton, Paxtang, Palmdale, and Lawnton. They also are in several scattered areas east of Hershey. The Duffield soils formed in material weathered from limestone.

In a typical profile the surface layer is dark-brown silt loam about 9 inches thick. The next layer, about 4 inches thick, is dark yellowish-brown silt loam. The subsoil extends to a depth of about 54 inches. It is yellowish-brown silty clay loam in the upper part and brownish-yellow, dark-brown, and dark reddish-brown

silty clay loam in the lower part. The underlying material is yellowish-red silt loam.

The Duffield soils have moderate permeability and high available moisture capacity.

These soils are suited to all general farm crops grown in the county.

Typical profile of Duffield silt loam, 3 to 8 percent slopes, moderately eroded, in an idle field 1¾ miles southwest of Hummelstown:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable when moist; neutral (limed); clear, smooth boundary.

A3—9 to 13 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable when moist; neutral; clear, wavy boundary.

B1t—13 to 18 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; few, thin clay films on ped faces; neutral; gradual, wavy boundary.

B21t—18 to 27 inches, yellowish-brown (10YR 5/8) silty clay loam; moderate, medium, subangular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; continuous clay films on ped faces; medium acid; gradual, wavy boundary.

B22t—27 to 35 inches, brownish-yellow (10YR 6/6) silty clay loam; moderate, medium, blocky structure; firm when moist, sticky and slightly plastic when wet; continuous clay films on ped faces; medium acid; gradual, irregular boundary.

B3—35 to 54 inches, dark-brown (7.5YR 4/4) and dark reddish-brown (5YR 3/3) silty clay loam; moderate, medium, blocky structure; friable when moist; some manganese films on ped faces; medium acid; clear, irregular boundary.

C—54 to 60 inches, yellowish-red (5YR 5/6) silt loam; weak, medium, platy structure; firm when moist; manganese films very distinct on ped faces; slightly acid.

The Ap horizon ranges from brown to dark brown. The B1t, B2t, and the B3 horizons each has colors that range from yellowish brown to dark brown. Depth to bedrock ranges from 5 to 10 feet.

The Duffield soils are near or adjacent to the Hagerstown and Lindside soils. The Duffield soils, like the Hagerstown soils, formed in place in material weathered from limestone; but the Lindside soils formed in alluvium weathered mostly from limestone. The B horizon of the Duffield soils is coarser textured and less red in color than the B horizon of the Hagerstown soils. The Duffield soils are well drained and free of mottles, but Lindside soils are only moderately well drained and typically are mottled at a depth of 15 to 30 inches.

Duffield silt loam, 3 to 8 percent slopes, moderately eroded (DuB2).—The largest acreage of this soil is near Palmdale, east of Hershey. Some small areas extend from west of Hummelstown to the vicinity of Harrisburg. In most areas erosion has removed part of the original surface layer and the plow layer is subsoil material mixed with the remaining surface layer. This soil has the profile described as typical for the series.

Most areas have been cleared and are used for general farm crops, alfalfa, and truck crops. The main management concerns are controlling erosion and maintaining good growth of crops. Practices that control surface water are needed to help reduce erosion and conserve moisture for plant use. (Capability unit IIe–1)

Duncannon Series

The Duncannon series consists of deep, well-drained soils that mainly are gently sloping. These soils are on terraces along the Susquehanna River and on several large islands in the river. They are above floodwaters. Duncannon soils formed in windblown materials mixed with sediments washed from glacial deposits.

In a typical profile the surface layer is dark-brown very fine sandy loam about 10 inches thick. The next layer, about 2 inches thick, is yellowish-brown very fine sandy loam. The subsoil extends to a depth of about 56 inches. The upper part is strong-brown very fine sandy loam, the middle is yellowish-brown silt loam, and the lower part is yellowish-brown very fine sandy loam. The underlying material is light brownish-gray and yellowish-brown very fine sandy loam that extends to a depth of 6 feet or more.

The Duncannon soils have moderate permeability, moderate to rapid internal drainage, and high available moisture capacity.

Most areas of these soils have been cleared and are used for general farm crops.

Typical profile of Duncannon very fine sandy loam, 3 to 8 percent slopes, moderately eroded, on Haldeman Island, 1 mile north of Clarks Ferry bridge:

Ap—0 to 10 inches, dark-brown (10YR 4/3) very fine sandy loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; neutral; clear, smooth boundary.

A3—10 to 12 inches, yellowish-brown (10YR 5/4) very fine sandy loam; moderate, medium, platy structure that breaks to moderate, fine and very fine, subangular blocky; friable when moist, nonsticky and nonplastic when wet; slightly acid; clear, wavy boundary.

B21t—12 to 26 inches, strong-brown (7.5YR 5/6) very fine sandy loam; moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; thin clay films; medium acid; gradual, wavy boundary.

B22t—26 to 38 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable when moist, sticky and nonplastic when wet; thin, continuous clay films on ped faces; medium acid; gradual, wavy boundary.

B3—38 to 56 inches, yellowish-brown (10YR 5/4) very fine sandy loam; weak, thick, platy structure that breaks to weak, fine and very fine, subangular blocky; friable when moist; strongly acid; gradual, wavy boundary.

C—56 to 72 inches +, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) very fine sandy loam; massive; friable to loose when moist; strongly acid.

The B horizon ranges from silt loam to fine sandy loam. The profile contains very few coarse fragments. In Dauphin County the solum of the Duncannon soils contains more fine sand than is typical for the series. Depth to bedrock ranges from about 6 to 8 feet.

The Duncannon soils are associated with the Chavies soils but are finer textured in the B horizon and have a thicker solum. Both kinds of soils are well drained and occur on terraces of about the same elevation.

Duncannon very fine sandy loam, 0 to 3 percent slopes (DvA).—This soil is in the southern part of the county. Most areas are on terraces along the Susquehanna River, north of Halifax, between Middletown and Conewago Creek. A few area are on Haldeman

Island north of Clarks Ferry bridge. Water erosion is only slight, but soil blowing has occurred in some places. The profile of this soil is similar to the one described as typical for the series but has a thicker surface layer. Included with this soil in mapping are a few areas that have more silt in the surface layer than is typical. Also included are several moderately eroded areas.

Most areas of this soil are cultivated and are used for general farm crops, alfalfa, and truck crops. The main management concern is maintaining the organic-matter content in the surface layer. Only the ordinary practices of good management are needed. (Capability unit I–1)

Duncannon very fine sandy loam, 3 to 8 percent slopes, moderately eroded (DvB2).—This soil is on terraces along the Susquehanna River, north of Halifax and south of Middletown near the Dauphin County line. Also, several small areas occur on Haldeman Island, north of Clarks Ferry bridge. Water erosion and soil blowing are slight to moderate. This soil has the profile described as typical for the series. Included in mapping are several small areas that have slopes of more than 8 percent and a thinner surface layer than is typical. Also included is a small area of steep soil.

Most of this soil is used for general farm crops, hay, orchard fruits, alfalfa, and truck garden crops. Practices that control surface water are needed to slow runoff, reduce erosion, and allow more moisture to enter the soil. (Capability unit IIe–2)

Hagerstown Series

The Hagerstown series consists of deep, nearly level to sloping, well-drained soils of the uplands. These soils occupy areas around Hummelstown, Hershey, and Palmdale. They formed in material weathered from limestone.

In a typical profile the surface layer is dark-brown silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches. The upper part is strong-brown silty clay loam. The middle, between depths of 15 and 43 inches, is reddish-brown and yellowish-red silty clay. The lower part is yellowish-red clay and dark olive-gray to olive-gray silty clay. The underlying material is black and dark olive-gray gritty silty clay. Gray limestone bedrock is at a depth of 64 inches.

The Hagerstown soils have moderate permeability and high available moisture capacity.

The native vegetation on these soils consisted mostly of hardwoods. Most areas have been cleared and are used for general farm crops.

Typical profile of Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field one-half mile west of Hershey Stadium and 220 feet south of the hay drying shed (Laboratory No. S64 Pa–22–6–1–9):

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; neutral; abrupt, smooth boundary.

B1—9 to 15 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; patches of clay films on ped faces; neutral; clear, wavy boundary.

B21t—15 to 25 inches, reddish-brown (5YR 4/4) silty clay; moderate, fine to medium, subangular blocky structure; friable when moist, sticky and very plastic when wet; parts of thin clay films in pores and on ped faces; neutral; clear, wavy boundary.

B22t—25 to 29 inches, reddish-brown (5YR 4/4) silty clay; moderate, medium, subangular blocky and blocky structure; friable when moist, sticky and plastic when wet; patches of clay films on ped faces; neutral; clear, wavy boundary.

B23t—29 to 35 inches, yellowish-red (5YR 4/6) silty clay; moderate, medium and coarse, blocky structure; slightly firm when moist, sticky and very plastic when wet; many, thick clay films and iron and manganese coatings on ped faces; slightly acid; gradual, wavy boundary.

B24t—35 to 43 inches, yellowish-red (5YR 4/6) silty clay; strong, medium, blocky structure; firm when moist, very sticky and very plastic when wet; thick, reddish-brown (5YR 4/4) clay films and fewer iron and manganese coatings on ped faces; very strongly acid; gradual, wavy boundary.

B25t—43 to 58 inches, yellowish-red (5YR 4/6) clay; strong, medium, blocky structure; firm when moist, very sticky and very plastic when wet; thick, reddish-brown (5YR 4/4) clay films on ped faces; very strongly acid; abrupt, irregular boundary.

B3t—58 to 60 inches, dark olive-gray (5Y 3/2) to olive-gray (5Y 4/2 and 5Y 5/2) silty clay; moderate, medium, blocky structure; friable when moist, very sticky and very plastic when wet; medium clay films on ped faces; medium acid; abrupt, irregular boundary.

C—60 to 64 inches, black (5Y 2/1) and dark olive-gray (5Y 3/2) silty clay; massive; friable when moist, very sticky and very plastic when wet; slightly acid; abrupt, irregular boundary.

R—64 inches +, gray limestone bedrock.

The B2 horizon ranges from silty clay loam to clay. It ranges from reddish brown (5YR 4/4) to yellowish red (5YR 4/6). Depth to limestone bedrock ranges from 4 to 12 feet.

The Hagerstown soils are adjacent to the Duffield soils. The Hagerstown soils and the Duffield soils both are well drained and deep, but the Hagerstown soils have redder colors in the subsoil and are finer textured.

Hagerstown silt loam, 0 to 3 percent slopes (HaA).—Runoff is slow on this soil, and erosion has removed slightly less than 25 percent of the surface layer. Otherwise, this soil has a profile similar to the one described as typical for the series. Included with this soil in mapping are several areas where the surface layer is very stony clay loam and where limestone crops out. Most areas, except those where rock crops out, are well suited to crops commonly grown in the county. Only the ordinary practices of good management are needed on this soil. (Capability unit I–1)

Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded (HaB2).—This soil occupies a 2-mile wide belt in the Hershey and Hummelstown areas. It has the profile described as typical for the series. Included with this soil in mapping are a few small areas that are more shallow to bedrock than is typical and that have a lower available moisture holding capacity than has this soil.

Most areas of this soil have been cleared and are used for general farm crops and alfalfa. Controlling erosion is the main management concern on this soil. Practices that control surface water are needed to

reduce erosion by retarding runoff. (Capability unit IIe–1)

Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded (HaC2).—Except that it is not so deep to bedrock, the profile of this soil is similar to that described as typical for the series. Included with this soil in mapping are a few acres of a severely eroded soil that has slopes of more than 15 percent. Also included are a few acres where the soils have a stony surface layer and rock outcrops. In other included areas, totaling less than 300 acres, the soils are shallow to bedrock and somewhat droughty.

Most areas of this soil are used for general farm crops, pasture, and trees. The stony areas are suited only to pasture or woodlots. Because the hazard of erosion is moderate to severe, management practices that control surface water and that maintain organic-matter content are needed. (Capability unit IIIe–1)

Huntington Series

The Huntington series consists of deep, nearly level to gently sloping, well-drained soils of medium texture. These soils are along natural drainageways and in low-lying areas where sediments have washed from soils on higher slopes that are underlain by limestone and Triassic conglomerate. Huntington soils occur in intermittent areas in a tract that extends from the Susquehanna River eastward through Hershey to Palmdale at the county line.

In a typical profile the surface layer is very dark grayish-brown silt loam about 12 inches thick. The next layer, about 6 inches thick, is dark-brown silt loam. The subsoil is dark yellowish-brown silt loam to a depth of 30 inches and is brown silt loam to a depth of 48 inches.

Huntington soils have moderate permeability and high available moisture capacity. These soils are slightly acid to neutral.

Although the areas of Huntington soils are small, where they can be cultivated, they are well suited to crops and are important to farming in the county. These soils are subject to flooding by runoff from adjacent slopes. Flooding from stream overflow is not a hazard.

Typical profile of Huntington silt loam, local alluvium, one-half mile west of Hershey on U.S. Highway No. 322, 300 feet north of the road:

Ap—0 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; neutral; clear, smooth boundary.

A2—12 to 18 inches, dark-brown (10YR 3/3) silt loam; weak, fine and medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; roots plentiful; many fine and medium pores; a few worm channels; slightly acid; gradual, wavy boundary.

B21—18 to 30 inches, dark yellowish-brown (10YR 3/4) silt loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; slightly acid; gradual, wavy boundary.

B22—30 to 48 inches +, brown (10YR 5/3) silt loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; neutral.

The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark brown (7.5YR 3/2). The A horizon ranges from 11 to 24 inches in thickness. The B horizon ranges from dark yellowish brown (10YR 3/4) to brown (10YR 5/3). It normally is silt loam, but in some places the B22 horizon has a higher content of clay. A few coarse fragments mixed with stratified sand and silt occur below a depth of 48 inches. Limestone bedrock is below a depth of 5 feet.

The Huntington soils are associated with the Hagerstown and the Duffield soils of the adjacent uplands and, like them, are deep and well drained.

Huntington silt loam, local alluvium (Hu).—This soil is nearly level to gently sloping and occurs in low-lying or depressional areas. It is well aerated, easy to work, and well suited to all general farm crops and truck crops, but there is a hazard of flooding by runoff from adjacent slopes. This soil is well suited to trees. Only the ordinary practices of good management are needed. (Capability unit I–1)

Klinesville Series

The Klinesville series consists of shallow, gently sloping to very steep, well-drained soils of the uplands. Where these soils are very steep, they are adjacent to soils of the flood plains. Klinesville soils mostly occur north of Blue Mountain in the northern half of the county, and a few small areas are scattered throughout the southern half. These soils formed in material weathered from acid red shale and sandstone.

In a typical profile the surface layer is dark reddish-brown shaly silt loam about 5 inches thick. The subsoil is red very shaly silt loam about 2 inches thick. The underlying material is red very shaly silt loam that is 80 to 90 percent coarse fragments, by volume. Shale bedrock is at a depth of 15 inches.

The Klinesville soils have moderately rapid permeability. They have low available moisture capacity and organic-matter content.

The native vegetation on these soils consisted of mixed hardwoods. Cleared areas have limited use for crops.

Typical profile of Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded in an idle field north of McLean Road, on the Indiantown Gap Military Reservation:

Ap—0 to 5 inches, dark reddish-brown (2.5YR 3/4) shaly silt loam; weak, fine, granular structure; friable when moist; 25 to 30 percent, by volume, is shale fragments; medium acid; gradual, wavy boundary.

B2—5 to 7 inches, red (2.5YR 4/6) very shaly silt loam; weak, fine, granular structure; friable when moist; 60 percent, by volume, is coarse fragments; medium acid; gradual, irregular boundary.

C—7 to 15 inches, red (2.5YR 4/6) very shaly silt loam; massive; 80 to 90 percent, by volume, is coarse fragments; strongly acid.

R—15 inches +, solid shale rock.

The Ap horizon contains coarse fragments that range from 15 to 30 percent, by volume; and the C horizon, from 60 to 90 percent, by volume. Depth to bedrock ranges from 10 to 20 inches.

The Klinesville soils are associated with the Calvin and the Leck Kill soils. The Klinesville soils are more shallow to bedrock than the moderately deep Calvin soils or the deep Leck Kill soils. The well-drained Klinesville soils are more droughty than the Calvin and the Leck Kill soils.

Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded (KaB2).—On this soil runoff is medium. Except that the surface layer is thicker, this soil has a profile similar to the one described as typical for the series. Included with this soil in mapping are a few areas that are severely eroded.

This soil is suitable for general farm crops and pasture. Management practices that control surface water are needed to reduce erosion by retarding runoff. (Capability unit IIIe–6)

Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded (KaC2).—This soil occurs mostly in the northern half of Dauphin County. A few areas are scattered south of Hershey. On this soil runoff is medium, but erosion is a moderate to severe hazard and available moisture capacity is low. This soil has the profile described as typical for the series. Included with this soil in mapping are several severely eroded areas where nearly all of the original surface layer has been lost.

This soil is too shallow for general farming and is used for hay and pasture. Good practices of pasture management are needed to conserve moisture by retarding runoff. (Capability unit IVe–2)

Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded (KaD2).—This soil occurs in the northern part of the county and in areas adjacent to small valleys south of Hershey. Except that it is more shallow to bedrock, the profile of this soil is similar to the one described as typical for the series. On this soil, runoff is rapid and erosion is a severe hazard.

Included with this soil in mapping are areas where solid shale crops out. Also included are areas where erosion has removed nearly all of the surface layer.

This soil generally is more suited to trees and shrubs than to grasses. The main management concern is controlling erosion. Practices that control surface water are needed to retard runoff and reduce erosion until vegetation is established. (Capability unit VIe–1)

Klinesville shaly silt loam, 25 to 50 percent slopes, moderately eroded (KaE2).—This soil is in the northern half of the county and in an area south of Hershey. Runoff is rapid on this soil. The profile of this soil is similar to that described as typical for the series. Included with this soil in mapping are several severely eroded areas where erosion has removed most of the surface layer.

This soil is so steep and shallow that it is not suitable for cultivation. Some areas are used for pasture. In wooded areas this soil is deep enough to bedrock to support trees and shrubs that provide food and cover for wildlife. The main management concerns are controlling runoff and maintaining the organic-matter content in the surface layer. A permanent cover of sod or trees is needed to protect this soil. (Capability unit VIIe–1)

Laidig Series

The Laidig series consists of deep, gently sloping to moderately steep, well-drained soils on uplands. These soils are in the northern half of Dauphin County. They formed on the lower slopes of mountain ranges in material weathered from gray sandstone and shale.

On the surface of a typical profile is 1 inch of very dark brown, partly decomposed leaf litter. The mineral surface layer is about 2 inches thick and consists of very dark gray gravelly loam. The next layer, about 8 inches thick, is pale brown gravelly loam. The subsoil, 32 inches thick, is light yellowish-brown gravelly sandy loam to a depth of 16 inches. The rest of the subsoil is reddish-yellow gravelly sandy clay loam and gravelly clay loam. The underlying material consists of compact, strong-brown gravelly sandy clay loam that restricts internal drainage. This compact layer (fragipan) is somewhat brittle. Sandstone and shale are at a depth of 60 inches.

The Laidig soils have moderate permeability above the fragipan and moderately slow permeability in it. Available moisture capacity is moderate.

The native vegetation on these soils consisted of mixed hardwoods. Much of the acreage of the Laidig soils is very stony and is best suited to trees. Some areas of these soils have been cleared, however, and are used for general farm crops and pasture.

Typical profile of Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded, in a wooded area, 2¼ miles north of Millersburg near the cemetery on Route 22001:

O2—1 inch to 0, very dark brown, partly decomposed leaf litter.

A1—0 to 2 inches, very dark gray (10YR 3/1) gravelly loam; weak, fine, granular structure with some platiness; friable when moist; 15 to 20 percent, by volume, is coarse sandstone fragments; very strongly acid; clear, smooth boundary.

A2—2 to 10 inches, pale-brown (10YR 6/3) gravelly loam; weak, fine, granular structure; friable when moist; 20 percent, by volume, is coarse sandstone fragments; very strongly acid; clear, wavy boundary.

B1t—10 to 16 inches, light yellowish-brown (10YR 6/4) gravelly sandy loam; weak, fine, subangular blocky structure; friable when moist; patches of clay films on ped faces; 25 percent, by volume, is sandstone fragments; strongly acid; gradual, wavy boundary.

B21t—16 to 26 inches, reddish-yellow (7.5YR 6/8) gravelly sandy clay loam; moderate, medium, subangular blocky structure; firm in place; thin, continuous clay films on ped faces; 30 percent, by volume, is coarse sandstone fragments; strongly acid; gradual, irregular boundary.

B22t—26 to 42 inches, reddish-yellow (7.5YR 6/6) gravelly clay loam; weak, medium, subangular blocky structure; firm when moist; many black coatings on ped faces; 25 percent, by volume, is sandstone fragments; very strongly acid; clear, irregular boundary.

Cx—42 to 60 inches, strong-brown (7.5YR 5/6) gravelly sandy clay loam; weak, medium, prismatic structure that breaks to moderate, medium, blocky; firm and brittle when moist; 20 percent, by volume, is coarse sandstone fragments; strongly acid; gradual, wavy boundary.

R—60 inches +, sandstone and shale bedrock.

The A horizon ranges from gravelly loam to very stony loam, and the B horizon from gravelly sandy loam to clay loam. Depth to the fragipan ranges from 30 to 42 inches, and depth to bedrock is more than 6 feet. In some included areas on Blue Mountain, depth to solid rock is 15 feet or more.

The Laidig soils are associated with the Buchanan and Andover soils. The Laidig soils are well drained, but the

Buchanan soils are moderately well drained and the Andover soils are poorly drained. The Laidig soils are free of mottles, but the Buchanan soils are mottled between depths of 15 and 46 inches, and the Andover soils are mottled from near the surface to a depth of about 42 inches.

Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded (LaB2).—This soil is at the base of steep slopes where erosion is not severe. It has the profile described as typical for the series. Included with this soil in mapping are a few areas where the soil is coarser textured than is typical.

Most areas of this Laidig soil have been cleared and are used for general farm crops or pasture. The main management concerns are controlling erosion and maintaining the organic-matter content in the surface layer. Practices that control surface water help to reduce erosion by retarding runoff. (Capability unit IIe–3)

Laidig gravelly loam, 8 to 20 percent slopes, moderately eroded (LaC2).—Except that it is not so deep to bedrock, the profile of this soil is similar to that described as typical for the series. Included with this soil in mapping are a few small areas of a soil more sandy than this soil. Also included are several severely eroded areas where slopes are more than 20 percent.

This soil is used mainly for pasture, but several areas are used for general farm crops. The main management concerns are controlling erosion and maintaining the organic-matter content. Practices that control surface water help to reduce erosion by retarding runoff. (Capability unit IIIe–2)

Laidig very stony loam, 0 to 8 percent slopes (LdB).—This soil occurs near the foot of steep hillsides where erosion is only slight. Except that large stones and boulders are on the surface and throughout the profile and that the surface layer is darker and thicker, the profile of this soil is similar to that described as typical for the series. Because of the stones and boulders, this soil is not suited to general farm crops and use for pasture is limited. This soil is well suited to trees and as wildlife habitat. (Capability unit VIs–1)

Laidig very stony loam, 8 to 25 percent slopes (LdD).—This soil occurs on the slopes of hills where colluvial material has washed and fallen from adjacent higher slopes. In these areas, runoff is medium and erosion is slight. Except that it has numerous stones and boulders on the surface and has a darker, thicker surface layer, the profile of this soil is similar to that described as typical for the series. Because this soil is too steep and stony for cultivated crops or pasture, it is used as woodland. (Capability unit VIs–1)

Lawrenceville Series

The Lawrenceville series consists of deep, nearly level to gently sloping soils that are moderately well drained. These soils formed in windblown silt and sand deposits on high terraces along the Susquehanna River. They are above flood plains.

In a typical profile the surface layer is dark-brown very fine sandy loam about 8 inches thick. The subsoil extends to a depth of 72 inches. The upper part is yellowish-brown very fine sandy loam. The middle, between depths of 25 and 34 inches, is dark yellowish-brown, mottled, compact fine sandy loam (fragipan). This compact layer is firm in place, but the soil material is easily crushed between thumb and fingers. The lower part of the subsoil is fine sandy loam that is dominantly yellowish brown and appears to be speckled with grayish-colored grains of sand rather than with grayish mottles.

Lawrenceville soils have moderate permeability above a depth of 25 inches and moderately slow permeability below that depth. Available moisture capacity is moderate.

The native vegetation on these soils consisted of mixed hardwoods. Most areas have been cleared and are used for general farm crops and truck crops.

Typical profile of Lawrenceville very fine sandy loam, 2 to 8 percent slopes, moderately eroded, in road cut in a housing development, about 3 miles south of Middletown on State Route 441:

Ap—0 to 8 inches, dark-brown (10YR 4/3) very fine sandy loam; weak, fine, granular structure; friable when moist; strongly acid; clear, smooth boundary.

B21t—8 to 16 inches, yellowish-brown (10YR 5/6) very fine sandy loam; weak, fine, subangular blocky structure; friable when moist; patches of thin clay films on ped faces; medium acid; gradual, wavy boundary.

B22t—16 to 25 inches, brownish-yellow (10YR 6/8) very fine sandy loam; weak, medium, subangular blocky structure; friable to firm when moist; thin, discontinuous clay films on ped faces; slightly acid; clear, wavy boundary.

Bx—25 to 34 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; common, medium, distinct mottles of grayish brown (10YR 5/2); weak, medium, subangular blocky structure that breaks to weak, thick, platy; firm in place but friable when removed; a few clay or silt films on ped faces; slightly acid; clear, irregular boundary.

B23—34 to 72 inches, yellowish-brown (10YR 5/6) fine sandy loam that has lenses of light brownish-gray (10YR 6/2) very fine sandy loam; grayish color seems to be the color of sand grains rather than of mottles; massive; very friable to loose; slightly acid.

In places the B21t, B22t, Bx, and B23 horizons each ranges from loam to fine sandy loam. Depth to mottles ranges from 18 to 36 inches. Depth to bedrock ranges from 6 to 8 feet.

The Lawrenceville soils are associated with the Duncannon soils. The Lawrenceville soils are moderately well drained and mottled, but the Duncannon soils are well drained and free of mottles.

Lawrenceville very fine sandy loam, 2 to 8 percent slopes, moderately eroded (LeB2).—This soil is on terraces above floodwaters. Areas occur intermittently within one-half mile of the Susquehanna River. Included with this soil in mapping are several small areas of a soil that has a surface layer and subsoil that are less sandy than is typical for Lawrenceville soils. Also included are a few areas where the slope is less than 2 percent and the plow layer is thicker than that in this soil.

Most areas of this soil have been cultivated and are used for general farm crops. The main management concerns are controlling erosion and maintaining the organic-matter content is the surface layer. Practices that control surface water help in reducing erosion and in maintaining fertility. (Capability unit IIe–5)

383-854 O - 71 - 6

Leck Kill Series

The Leck Kill series consists of deep, nearly level to sloping, well-drained soils on uplands. These soils occur in areas between mountains in the northern half of Dauphin County. Leck Kill soils formed in material weathered from acid red shale and sandstone.

In a typical profile the surface layer is reddish-brown shaly silt loam about 10 inches thick. The subsoil extends to a depth of 25 inches and is weak-red shaly silt loam and very shaly silt loam. This layer contains coarse fragments, and the percentage of coarse fragments increases with depth. Weak-red, weathered shale makes up 90 percent of the underlying material, by volume, and silty clay loam 10 percent. Red shale and sandstone occur at a depth of about 42 inches.

The Leck Kill soils have moderate permeability, medium to rapid internal drainage, and moderate available moisture capacity.

Native vegetation on these soils consisted of mixed hardwoods. Most areas have been cleared and are used for general farm crops.

In this county the Leck Kill soils are mapped only in complex with the Calvin soils.

Typical profile of a moderately eroded Leck Kill shaly silt loam, 3 to 8 percent slopes, in a cultivated field 3 miles west of Berrysburg:

Ap—0 to 10 inches, reddish-brown (2.5YR 4/4) shaly silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; 20 percent, by volume, is coarse fragments; neutral; abrupt, smooth boundary.

B21t—10 to 14 inches, weak-red (10R 4/3) shaly silt loam; weak, medium, subangular blocky structure that breaks to blocky; friable when moist, slightly sticky and nonplastic when wet; common, thin clay films in pores and on shale surfaces; 20 percent, by volume, is coarse fragments; slightly acid; clear, wavy boundary.

B22t—14 to 18 inches, weak-red (10R 4/3) shaly silt loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; thin clay films in pores and on shale surfaces; 25 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

B3t—18 to 25 inches, weak-red (10R 5/3) very shaly silt loam; weak, fine, subangular blocky structure modified by shale; friable when moist, slightly sticky and slightly plastic when wet; medium clay films in pores and on shale surfaces; 60 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

C—25 to 42 inches, weak-red (10R 4/3) weathered shale (90 percent) and silty clay loam fillings; very firm when moist, sticky and nonplastic when wet; medium to thick clay films on shale surfaces; very strongly acid; clear, irregular boundary.

R—42 inches +, dusky-red (10R 3/4), thinly bedded shale and thinly bedded sandstone; 98 percent, by volume, is coarse fragments; very strongly acid.

The B horizon ranges from reddish brown to weak red in color. In some places an indistinct, thin sandy layer occurs in the lower part of the C horizon. Depth to bedrock ranges from 40 to 72 inches.

The Leck Kill soils are associated with the Calvin and the Klinesville soils. The Leck Kill, Calvin, and Klinesville soils are well drained and free of mottles. Leck Kill soils are deep, Calvin soils are moderately deep, and Klinesville soils are shallow.

Lehew Series

The Lehew series consists of moderately deep, well-drained soils on sandstone ridges. Most areas are steep or are on high hilltops and in saddles, but some areas are gently sloping. These soils formed in material underlain by reddish-gray sandstone and red shale imbedded with the sandstone.

In a typical profile many stones and boulders are on the surface. The surface layer is dark reddish-brown very stony sandy loam about 2 inches thick. The next layer, about 2 inches thick, is reddish-brown channery loam. The subsoil extends to a depth of 24 inches and is reddish-brown channery sandy loam and red channery loam. The underlying material is weak-red very gravelly loam. Sandstone bedrock is at a depth of 32 inches.

Lehew soils have moderately rapid permeability and moderate to low available moisture capacity.

All areas of these soils are wooded.

In this county the Lehew soils are mapped only in undifferentiated mapping units with the Dekalb soils.

Typical profile of Lehew very stony sandy loam that has a slope of 8 to 25 percent, in a wooded area:

A1—0 to 2 inches, dark reddish-brown (5YR 3/2) very stony sandy loam; weak, medium, granular structure; very friable when moist; 20 percent, by volume, is coarse fragments; very strongly acid; clear, smooth boundary.

A2—2 to 4 inches, reddish-brown (2.5YR 4/4) channery loam; weak, fine, granular structure; friable when moist; 20 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

B1—4 to 9 inches, reddish-brown (5YR 5/4) channery sandy loam; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; 20 to 25 percent, by volume, is coarse fragments; very strongly acid; gradual, wavy boundary.

B2—9 to 24 inches, red (2.5YR 4/6) channery loam; moderate, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; 25 to 30 percent, by volume, is channery sandstone fragments; very strongly acid; gradual, wavy boundary.

C—24 to 32 inches, weak-red (10R 4/4) very gravelly loam; structure obscured by shale and sandstone fragments; firm to very firm when moist, nonsticky and nonplastic when wet; 60 to 80 percent by volume, is sandstone fragments; very strongly acid; gradual, wavy boundary.

R—32 inches +, sandstone bedrock.

On the surface and throughout the A horizon are many large stones and boulders. Throughout the profile, hue ranges from 5YR to 10R. Depth to bedrock ranges from 24 to 40 inches.

The Lehew soils are similar to the Dekalb soils in texture but are redder. Both kinds of soils are moderately deep and well drained.

Lehigh Series

The Lehigh series consists of deep, gently sloping, moderately well drained soils on uplands. These soils occur south of Hershey in the southern part of the county. They are in depressional or low-lying areas. Lehigh soils formed in material underlain by dark-colored, noncalcareous shale and sandstone that were metamorphosed by contact with diabase intrusions.

In a typical profile the surface layer is dark grayish-brown silt loam about 9 inches thick. The subsoil extends to a depth of 32 inches and, from a depth of 12 inches, is mottled with yellowish and brownish colors. The upper part of the subsoil is dark grayish-brown and gray silty clay loam. The lower part is grayish-brown shaly silty clay loam. The underlying material is gray very shaly clay loam mottled with yellowish brown. Bluish-gray and greenish-gray, partly weathered shale occurs at a depth of 48 inches.

The Lehigh soils have moderate permeability in the surface layer and slow permeability in the subsoil. Available moisture capacity is moderate.

The native vegetation on these soils consisted of mixed hardwoods, including maple, white oak, ash, hickory, and black oak. Most areas have been cleared and are used for pasture, hay, and shallow-rooted crops.

Typical profile of Lehigh silt loam, 3 to 8 percent slopes, moderately eroded, in a pasture one-quarter mile north of Deodate:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; neutral (limed); clear, wavy boundary.

B1—9 to 12 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; neutral (limed); gradual, wavy boundary.

B21t—12 to 18 inches, gray (5Y 5/1) silty clay loam that has few, fine, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable to firm when moist, slightly sticky and slightly plastic when wet; thin clay films on ped faces; 5 to 10 percent, by volume, is coarse fragments; slightly acid; clear, irregular boundary.

B22t—18 to 32 inches, grayish-brown (2.5Y 5/2) shaly silty clay loam that has common, medium, distinct mottles of brownish yellow (10YR 6/8); moderate, medium, subangular blocky structure; friable to firm when moist, slightly sticky and slightly plastic when wet; thin clay films on ped faces; 30 percent, by volume, is coarse fragments; medium acid; gradual, wavy boundary.

C—32 to 48 inches, gray (5Y 5/1) very shaly clay loam that has many, fine, faint mottles of yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4); moderate to strong, coarse, blocky structure with some platiness; firm when moist, sticky and slightly plastic when wet; few patchy clay films; 50 to 60 percent, by volume, is coarse fragments; strongly acid; gradual, irregular boundary.

R—48 inches +, partly weathered, bluish-gray and greenish-gray shale.

The B2t horizon ranges from silt loam to silty clay loam. Depth to mottling ranges from 12 to 25 inches. Porcelanite and hard-baked shale occur between depths of 42 and 60 inches.

The Lehigh soils occur near the Brecknock, Croton, and Penn soils. The Lehigh soils are similar to the well-drained Brecknock soils in color and texture and formed in similar parent material. The moderately well drained Lehigh soils have a seasonal high water table and are mottled between depths of 15 and 32 inches, but the water table in the poorly drained Croton soils is at or near the surface for long periods and mottles are present between depths of 8 and 42 inches. The dark grayish-brown Lehigh soils are unlike the reddish-brown Penn soils, which are well drained and free of mottles.

Lehigh silt loam, 3 to 8 percent slopes, moderately eroded (LhB2).—This soil occurs only in the southern part of the county. The erosion hazard is moderate.

Included with this soil in mapping are a few areas where the surface layer is thicker than is typical. Also included are several areas where the slopes are more than 8 percent. Another inclusion is an area of less than 100 acres where the surface layer is dark yellowish brown and the subsoil is yellowish brown or brown.

Most areas of this soil have been cleared and are used for cultivated crops, and several areas are used for pasture or trees. Practices are needed for controlling erosion, maintaining the organic-matter content, and removing excess water from the subsoil. (Capability unit IIIw–2)

Lewisberry Series

The Lewisberry series consists of deep, gently sloping to very steep, well-drained soils on uplands. These soils occupy hilly areas south of Hershey. They occur mostly in the townships of Derry, Conewago, and Londonderry. Lewisberry soils formed in material weathered from red sandstone conglomerate and shale.

In a typical profile the surface layer is about 9 inches thick. It is reddish-brown gravelly sandy loam that is 20 percent coarse fragments, by volume. The subsoil extends to a depth of 40 inches and is mainly reddish-brown gravelly sandy clay loam and dark-red very gravelly sandy clay loam. In the subsoil coarse fragments increase with depth from 20 percent to 40 percent, by volume. The underlying material is partly weathered, coarse sandstone conglomerate that contains many rounded quartz pebbles.

Lewisberry soils have moderately rapid permeability and moderate available moisture capacity.

The native vegetation on these soils consisted of mixed hardwoods. Many areas have been cleared and are used for general farm crops.

Typical profile of Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded, 1.5 miles south of Hershey:

Ap—0 to 9 inches, reddish-brown (5YR 4/4) gravelly sandy loam; weak, fine, granular structure; friable when moist; 20 percent, by volume, is coarse fragments; medium acid; clear, wavy boundary.

B1—9 to 12 inches, reddish-brown (5YR 4/3) gravelly sandy loam; weak, fine, granular structure; friable when moist; 20 percent, by volume, is coarse fragments; medium acid; gradual, irregular boundary.

B2t—12 to 34 inches, reddish-brown (5YR 5/3) gravelly sandy clay loam; weak, medium, subangular blocky structure; firm when moist, slightly sticky when wet; thin, discontinuous clay films; 25 percent, by volume, is coarse fragments; medium acid; clear, irregular boundary.

B3—34 to 40 inches, dark-red (10R 3/6) gravelly sandy clay loam; moderate, medium, subangular blocky structure; firm when moist, slightly sticky when wet; few iron and manganese coatings on ped faces; 40 percent, by volume, is coarse fragments; medium acid; gradual, irregular boundary.

C—40 to 48 inches +, red (10R 4/6), partly weathered, coarse sandstone conglomerate that contains many rounded quartz pebbles.

The Ap horizon ranges from gravelly sandy loam to very stony sandy loam. The B2 horizon ranges from sandy loam

to sandy clay loam. Thickness of the solum ranges from 36 to 50 inches, and bedrock is at a depth of more than 4 feet.

The Lewisberry soils are associated with Penn, Readington, and Croton soils. The Lewisberry soils have a thicker profile than Penn soils but are similar to them because both kinds of soils are free of mottles in the B horizon. Unlike the mottle-free Lewisberry soils, Readington soils are mottled between depths of 15 and 33 inches, and the poorly drained, grayer Croton soils are mottled near the surface.

Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded (LrB2).—This soil occurs on ridgetops, on hillsides, and at the bottom of slopes. Except that it is deeper to bedrock, the profile of this soil is similar to that described as typical for the series. Included with this soil in mapping are several small areas where slopes are less than 3 percent.

Most of this soil has been cleared and cultivated, and some areas are in pasture. Controlling erosion and maintaining the organic-matter content are the main management concerns. Practices that control surface water on long slopes are needed to help prevent erosion and to maintain good growth of crops. (Capability unit IIs–2)

Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded (LrC2).—This soil has medium runoff. Its profile is the one described as typical for the series.

Included with this soil in mapping are a few small areas where the surface layer is higher in organic-matter content and is darker colored and thicker than is typical. Also included are areas of a severely eroded soil.

This soil is cultivated, in pasture, or used as woodland. The main management concerns are controlling erosion and maintaining the organic-matter content. Practices are needed that control surface water, reduce erosion, and permit more water to soak into the soil for plant use. (Capability unit IIIe–4)

Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded (LrD2).—This soil occurs on hillsides where runoff is medium and the erosion hazard is moderate to severe. Except that it is not so deep to bedrock, the profile of this soil is similar to the one described as typical for the series.

Included with this soil in mapping are several areas of a slightly eroded soil that has a dark-colored organic layer on the surface and that has a thicker profile than that of this soil. Also included are several medium-sized, severely eroded areas where slopes are more than 25 percent and the profile is thinner than that of this soil.

Most areas of this soil have been cleared and cultivated, but they are now in pasture or have reverted to woodland. Practices that control surface water are needed to help to reduce erosion by retarding runoff. (Capability unit IVe–3)

Lewisberry very stony sandy loam, 5 to 25 percent slopes (LsD).—This soil occupies ridgetops. It has a dark-colored layer of organic matter on the surface and numerous stones and boulders on the surface and in the profile. Otherwise, the profile of this soil is similar to the one described as typical for the series. Included with this soil in mapping are several areas where the surface layer is more clayey and less sandy than that of this soil.

Erosion and runoff are not management concerns, because this soil is stony and is used for pasture and trees. Most areas are woodland. (Capability unit VIs–1)

Lewisberry very stony sandy loam, 25 to 60 percent slopes (LsF).—This soil occurs in rough, steep areas in the southern part of Dauphin County. The profile of this soil is similar to the one described as typical for the series, except that it is very stony and is thinner. This soil is too steep and stony for cultivated crops or pasture. Where this soil remains wooded, only practices of good woodland management are needed. (Capability unit VIIs–1)

Lindside Series

The Lindside series consists of deep, nearly level, moderately well drained soils on flood plains. These soils are subject to flooding. They occupy areas along streams in the limestone areas near Hershey and south of Hummelstown and are in several areas along the Susquehanna River. Lindside soils formed in sediments washed mainly from limestone but also from shale and sandstone.

In a typical profile the surface layer is brown silt loam about 9 inches thick. The subsoil extends to a depth of 42 inches and is dark-brown silt loam. It is underlain by layers of sand and silt that contain a few sandstone pebbles. Mottles of grayish and brownish colors are between depths of about 18 to 60 inches or more.

The Lindside soils have moderately slow permeability and high available moisture capacity. These soils have a seasonal high water table.

Mixed hardwoods were the native vegetation on these soils. Most areas have been cleared and are used for general farm crops, hay, and pasture.

Typical profile of Lindside silt loam (0 to 3 percent slopes), sampled about 2½ miles south of Hummelstown, west of Route T. 390:

Ap—0 to 9 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; slightly acid; clear, smooth boundary.

B21—9 to 18 inches, dark-brown (7.5YR 4/4) silt loam; weak, fine, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; slightly acid; gradual, wavy boundary.

B22—18 to 28 inches, dark-brown (10YR 4/3) silt loam; few, medium, distinct mottles of grayish brown (10YR 5/2); weak, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; slightly acid; gradual, wavy boundary.

B3—28 to 42 inches, dark-brown (7.5YR 4/4) silt loam; common, medium, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; neutral; gradual, wavy boundary.

C—42 to 60 inches +, dark grayish-brown (10YR 4/2), stratified sand and silt that contain a few sandstone pebbles; common, medium, distinct mottles of grayish brown (2.5Y 5/2); massive; very friable when moist; neutral.

The Ap horizon ranges from 5YR to 10YR in hue. The B2 horizon ranges from loam to silty clay loam. Its hue

ranges from 7.5YR to 10YR but generally is 10YR. Depth to mottling ranges from 15 to 30 inches. In some places the C horizon has many coarse fragments of quartz. Gravel in the profile ranges from 5 to 10 percent, by volume.

The moderately well drained Lindside soils are adjacent to the well drained Tioga soils. The Lindside soils have a seasonal high water table and depth to mottling is between 15 and 30 inches. In contrast, the Tioga soils have a deep water table, and depth to mottling is 36 inches.

Lindside silt loam (0 to 3 percent slopes) (Lt).—This soil occurs next to streams that flood. It has the profile described as typical for the series.

Included with this soil in mapping are few small areas of a poorly drained soil that is mottled near the surface. Also included are several areas where slopes are more than 3 percent and the surface layer is thinner than is typical. Other inclusions are areas of a soil that has a light-colored subsoil containing a large amount of clay and silt.

This soil is used mainly for pasture and hay. The main management concerns are flooding and a seasonal high water table that restricts root development. A subsurface system of drainage is needed to dispose of excess water when the water table is high. (Capability unit IIw–1)

Lindside silt loam, coal overwash (Lw).—This soil is nearly level and is adjacent to streams that flood. The coal overwash on the surface is as much as 7 inches thick. In areas where the overwash is thinner, it has been mixed into the plow layer. In these areas plants grow fairly well. Except for the coal overwash on the surface, this soil has a profile similar to the one described as typical for the series.

Included with this soil in mapping are areas that have a layer of coal overwash on the surface but that are poorly drained, somewhat poorly drained, or well drained.

Many areas of this soil are wooded, some are in pasture, and others are cultivated. Where the coal overwash is not mixed into the plow layer, large additions of lime and fertilizer are needed if crops are to be grown. On wet areas of this soil, a system for removing excess internal water is needed. (Capability unit IIw–1)

Made Land, Sanitary Fill

Made land, sanitary fill (Ma) consists of alternate layers of garbage and soil material that have been compacted by heavy equipment. The layers of soil material are from more than one kind of soil but generally are from soils formed in material weathered from shale or limestone. A few areas of this made land are used for field crops and pasture plants. (Capability unit not assigned)

Mine Dumps

Mine dumps (Md) consists of mounds and huge piles of fine residue from coal-breaking machines and of mining refuse that consists of sandstone, slate, and coal screenings. These mounds and piles are around the openings of deep shafts or tunnels. Little or no vegetation grows on Mine dumps because of extreme acidity and of high temperatures resulting from the black surface. (Capability unit not assigned)

Muck

Muck is a wet, nearly level, organic soil that occupies saddles in mountain slopes where water is trapped or where drainage is very slow. This soil is in an area north of Wiconisco in the northeastern part of the county and in an area southeast of Carsonville on the north side of Peters Mountain. These two areas total about 200 acres. Muck is decayed peat that formed from built-up deposits of material from sedges, reeds, cattails, leaves, and woody plants.

In a typical profile the surface layer, about 4 inches thick, is a dark reddish-brown mat of intermingled leaves, mosses, roots, and twigs. The next 4 layers extend to a depth of 86 inches and are black grayish-brown and dark-gray muck. Between depths of 66 and 86 inches, the dark-gray muck has a few patches of yellowish-red sand. The underlying material is reddish-gray silt loam that has occasional patches of gray sand. Sandstone and shale occur at a depth of 96 inches.

Muck has a water table that remains near the surface most of the year and never drops below a depth of 3 feet.

The native vegetation on this soil consisted of woody plants, shrubs, and mosses that grow on water maples.

Typical profile of Muck in a nearly level area on the north side of Peters Mountain:

1—0 to 4 inches, dark reddish-brown (5YR 3/2) mat of intermingled leaves, mosses, roots, and twigs.
2—4 to 48 inches, black (N 2/0) organic matter; massive; friable; very strongly acid; gradual, wavy boundary.
3—48 to 56 inches, grayish-brown (2.5Y 5/2), finely divided organic matter; massive; friable when moist, slightly sticky when wet; very strongly acid; gradual, wavy boundary.
4—56 to 66 inches, dark-gray (N 4/0), finely divided organic matter; massive; friable when moist, slightly sticky when wet; very strongly acid; gradual, wavy boundary.
5—66 to 86 inches, dark-gray (N 4/0), finely divided organic matter; few, small patches of yellowish-red sand; massive; friable when moist, slightly sticky when wet; very strongly acid; gradual, irregular boundary.
6—86 to 96 inches, reddish-gray (5YR 5/2) silt loam; massive; friable when moist, nonsticky and nonplastic when wet; strongly acid; occasional patches of gray sand.
7—96 inches +, sandstone and shale bedrock.

Depth to bedrock ranges from 5 to 10 feet.

Muck (Mu).—This soil consists of organic materials that have decomposed so much that individual plant parts cannot be recognized. It is nearly level or depressional and occurs in mountainous areas where water has been trapped and the organic materials have accumulated. Most areas of Muck have not been cleared, because drainage is so difficult. Muck is suitable for wildlife habitat and has limited use as woodland. (Capability unit VIIw–1)

Neshaminy Series

The Neshaminy series consists of deep, gently sloping to moderately steep, well-drained soils on uplands. These soils occupy low-lying ridges near Deo-

date and south of Hershey in the southern part of Dauphin County. The Neshaminy soils formed in material weathered from diabase.

In a typical profile a few stones and boulders are on the surface. The surface layer is dark yellowish-brown gravelly silt loam about 10 inches thick. The subsoil extends to a depth of 40 inches and is strong-brown and yellowish-red silty clay loam that is 10 to 15 percent coarse fragments, by volume. The underlying material is yellowish-red gritty clay loam. Diabase bedrock occurs at a depth of about 46 inches.

The Neshaminy soils have moderate permeability and available moisture capacity. Internal drainage is medium.

The native vegetation on the Neshaminy soils consisted of mixed hardwoods. Where these soils have been cleared of trees and stones general farm crops are grown, but most areas are very stony and have remained wooded.

Typical profile of Neshaminy gravelly silt loam, 3 to 12 percent slopes, moderately eroded, 4 miles south of Hershey near Deodate:

Ap—0 to 10 inches, dark yellowish-brown (10YR 4/4) gravelly silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; 15 to 20 percent, by volume, is coarse fragments; slightly acid; abrupt, smooth boundary.

B21t—10 to 26 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, blocky structure; firm when moist, sticky and slightly plastic when wet; clay films on ped faces; 10 to 15 percent, by volume, is coarse fragments; medium acid; gradual, irregular boundary.

B22t—26 to 40 inches, yellowish-red (5YR 5/6) silty clay loam; moderate, medium, blocky structure; firm when moist, sticky and plastic when wet; few patchy clay films and numerous coatings of black manganese on ped faces; 10 percent, by volume, is coarse fragments; medium acid; clear, wavy boundary.

C—40 to 46 inches, yellowish-red (5YR 5/8) gritty clay loam; moderate, medium, blocky structure; firm when moist, slightly sticky when wet; medium acid; clear, wavy boundary.

R—46 inches+, diabase bedrock.

The stones and boulders on the surface range from few to many. The Ap horizon ranges from gravelly silt loam to very stony silt loam. The B21t and B22t horizons range from silty clay loam to gritty clay loam. In these horizons coarse fragments, by volume, range from 10 percent to 25 percent. Depth to bedrock ranges from 3½ to 6 feet.

The Neshaminy soils are adjacent to the Brecknock, Lehigh, and Watchung soils. The Neshaminy are similar to the Brecknock soils in that they are well drained and free of mostly dark yellowish brown and yellowish red, and the Brecknock soils are mostly dark grayish brown. The Neshaminy soils are lighter colored than the Lehigh soils, which are mottled in the subsoil. They are also lighter colored than the Watchung soils, which are mottled near the surface.

Neshaminy gravelly silt loam, 3 to 12 percent slopes, moderately eroded (NeC2).—This soil is on broad ridges. It has the profile described as typical for the series.

Included with this soil in mapping are a few small areas where slopes are less than 3 percent and erosion is only slight. Also included are some areas where slopes are more than 12 pecent and erosion is severe.

Most of this soil is used for general farm crops and orchard fruits, but several areas are in pasture or trees.

Controlling erosion and maintaining organic-matter content in the surface layer are the main concerns in managing this soil. Practices that control surface water are needed to slow runoff on the steeper or longer slopes so that erosion is reduced and more water soaks into the soil. (Capability unit IIe–1)

Neshaminy very stony silt loam, 0 to 8 percent slopes (NsB).—This soil is on low ridges in the southern part of the county. It has a profile similar to the one described as typical for the series, except that numerous large stones and boulders are on the surface and throughout the profile and that the dark-brown surface layer has a high content of organic matter.

Included with this soil in mapping are several areas where the surface layer is dark grayish brown and the subsoil contains chips of porcelanite.

This soil is so rough and stony that it is not suited to crops or pasture. It is suited to trees. (Capability unit VIs–1)

Neshaminy very stony silt loam, 8 to 25 percent slopes (NsD).—This soil occupies areas near Deodate and Round Top Mountain in Londonderry and Conewago Townships. It has a profile similar to the one described as typical for the series, except that it is not so deep to bedrock and that many large stones and a dark, organic layer are on the surface.

Included with this soil in mapping are a few acres where slopes are more than 25 percent and the profile is thinner. Also included is an area where the surface layer and subsoil are dark grayish brown.

The main management concern is the stones and boulders on the surface. This soil is better suited to trees than to crops or pasture. (Capability unit VIs–1)

Penn Series

The Penn series consists of moderately deep, gently sloping to sloping, well-drained soils on uplands. These soils occupy an area about 5 miles wide that extends across the southern part of the county from the Susquehanna River to Lebanon County. Penn soils formed in material weathered from red Triassic sandstone and shale.

In a typical profile the surface layer is reddish-brown shaly silt loam about 6 inches thick. The subsoil is red shaly silt loam and silty clay loam and has a high percentage of coarse fragments, by volume. Red shale fragments occur at a depth of about 29 inches.

Penn soils have moderately rapid permeability, medium internal drainage, and moderate available moisture capacity.

The native vegetation on these soils consisted of mixed hardwoods. Most areas have been cleared and are used for general farm crops, hay, and pasture.

Typical profile of Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded, one-half mile east of Middletown Farmers Market in a housing development north of T. 322:

Ap—0 to 6 inches, reddish-brown (5YR 5/4) shaly silt loam; weak, medium, granular structure; friable when moist, 15 to 20 percent, by volume, is coarse fragments; medium acid; clear, smooth boundary.

B21t—6 to 16 inches, red (2.5YR 5/6) shaly silt loam; moderate, medium, subangular blocky structure; firm when moist, slightly sticky when wet; patches of thin clay films on ped faces; 20 percent, by volume, is coarse fragments; very strongly acid; gradual, wavy boundary.

B22t—16 to 26 inches, weak-red (10R 4/4) shaly silty clay loam; strong, medium to coarse, blocky structure; very firm when moist, slightly sticky when wet; clay films on ped faces; 40 percent, by volume, is coarse fragments; very strongly acid; clear, wavy boundary.

B23t—26 to 29 inches, red (10R 4/6) very shaly silt loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; patches of clay films on ped faces; 50 to 60 percent, by volume, is shale fragments; strongly acid; gradual, irregular boundary.

C—29 inches +, red shale fragments.

The B21t, B22t, and B23t horizons each ranges from shaly silt loam to shaly silty clay loam. Shale fragments, by volume, range from 10 percent in the Ap horizon to 60 percent in the B23t horizon. Depth to bedrock ranges from 1½ to 3 feet. The Penn soils normally are strongly acid and very strongly acid, but they are neutral in some areas where the soils have been limed or were formed in material high in content of carbonates.

The Penn soils are associated with the Readington, Croton, and Lewisberry soils. The Penn soils are free of mottles and are better drained than the Readington soils, which are mottled at a depth of 15 to 30 inches. They are also better drained than the grayish Croton soils, which are mottled near the surface. Penn soils are finer textured and have a thinner profile than the Lewisberry soils.

Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded (PeB2).—This soil occurs in the southern half of Dauphin County. It has the profile described as typical for the series.

Included with this soil in mapping are a few acres where slopes are less than 3 percent and the surface layer is thicker than is typical. Also included are some areas that are underlain by calcareous bedrock. Another inclusion is 5 acres where erosion has removed almost all of the original surface layer.

Most areas of this soil have been cleared and are used for general farm crops. Management that controls surface water is needed to reduce erosion and increase infiltration of water that plants can use. (Capability unit IIe–4)

Penn shaly silt loam, 8 to 15 percent slopes, moderately eroded (PeC2).—This soil is in the southern half of Dauphin County. Except that it is slightly shallower to bedrock, the profile of this soil is similar to the one described as typical for the series.

Included with this soil in mapping are several small areas where erosion has removed nearly all of the original surface layer. Also included are several other severely eroded areas where slopes are more than 15 percent.

Most of this soil has been cultivated and is used for general farm crops, but the included steeper, severely eroded areas are used for pasture or trees. (Capability unit IIIe–3)

Philo Series

The Philo series consists of deep, nearly level, moderately well drained soils on flood plains. These soils mainly occupy narrow strips adjacent to streams in the gray shale and sandstone areas of the southern part of the county. Philo soils formed in sediments washed from shale and sandstone and deposited near stream channels by floodwaters.

In a typical profile the surface layer is dark grayish-brown silt loam about 12 inches thick. The underlying material extends to a depth of 60 inches or more. It is dark yellowish-brown, strong-brown, and yellowish-brown silt loam to very fine sandy loam to a depth of 36 inches. The next layer is strong-brown gravelly silt loam, and it is underlain by a layer that is 80 to 90 percent waterworn cobbly material. Between depths of 18 and 60 inches the underlying material is mottled with gray and brownish gray.

Philo soils have a seasonal high water table. They have moderate permeability and high available moisture capacity.

The native vegetation on these soils consisted of mixed hardwoods. Most areas have been cleared but are used mostly for hay and pasture because the areas are narrow and flooding is a severe hazard.

Typical profile of Philo silt loam in a nearly level area along a pipeline 1.5 miles south of Manada Gap:

Ap—0 to 12 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist, slightly acid when wet; clear, smooth boundary.

B21—12 to 20 inches; dark yellowish-brown (10YR 4/4) silt loam that has few, fine, faint mottles of grayish brown (10YR 5/2) in the lower part; moderate, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; medium acid; gradual, wavy boundary.

B22—20 to 28 inches, strong-brown (7.5YR 5/6) loam that has few, medium, distinct mottles of light brownish gray (10YR 6/2); weak, fine, subangular blocky structure; friable when moist; strongly acid; clear, irregular boundary.

B23—28 to 36 inches, yellowish-brown (10YR 5/6) very fine sandy loam that has common, medium, distinct mottles of gray (5Y 6/1); weak, medium, subangular blocky structure; friable when moist; very strongly acid; clear, wavy boundary.

IIC1—36 to 60 inches, strong-brown (7.5YR 5/6) gravelly silt loam that has common, medium, distinct mottles of gray (5Y 6/1); massive; friable when moist, slightly sticky when wet; 50 percent, by volume, is pebbles and cobblestones; very strongly acid; clear, wavy boundary.

IIIC2—60 inches +, 80 to 90 percent waterworn cobbly material and 10 to 20 percent silt and sand.

The B horizon ranges from very fine sandy loam to silty clay loam. It ranges from 5YR to 10YR in hue. In some areas these soils are underlain by sand and gravel at a depth ranging from 3 to 5 feet. Bedrock occurs at a depth below 5 feet.

The Philo soils are associated with the Atkins soils and with the Tioga soils. The Philo soils are better drained than the Atkins soils, which have grayer colors below the surface layer and mottles nearer the surface. The Philo soils are not so well drained as the Tioga soils. Depth to mottling in the Philo soils is between 18 and 30 inches, but the Tioga soils are free of mottles.

Philo silt loam (Ph).—This soil occupies areas that are flooded at times. It has the profile described as typical for the series. Included with this soil in mapping are a few small areas of a deep, well-drained soil.

Most areas of this soil are cultivated and are used for general farm crops, but some areas are in pasture.

Crops are occasionally damaged by floods and the high water table. Drainage systems are needed to remove excess water during periods of high water. (Capability unit IIw–1)

Readington Series

The Readington series consists of deep, gently sloping, moderately well drained soils on uplands. These soils occur in the southern part of Dauphin County. They formed in material weathered from Triassic red shale and sandstone.

In a typical profile the surface layer is reddish-brown silt loam about 12 inches thick. The subsoil extends to a depth of 50 inches. The upper part is yellowish-red silt loam about 3 inches thick. The middle, between depths of 15 and 33 inches, is mottled, yellowish-red and and strong-brown silty clay loam. The lower part of the subsoil is a yellowish-red and dark-red, brittle, compact (fragipan) clay loam that is mottled to a depth of 42 inches, and the rest is shaly. Underlying the subsoil is dusky-red, partly weathered shale.

Readington soils have moderately slow permeability and moderate available moisture capacity. Surface drainage is moderately rapid, but internal drainage is restricted by the brittle, compact fragipan.

Mixed hardwoods were the native vegetation on these soils. Most areas have been cleared and are used for general farm crops.

Typical profile of Readington silt loam, 3 to 8 percent slopes, moderately eroded, 1 mile south of the Pennsylvania Turnpike on Pennsylvania Route 743 and 400 feet east on T. 303:

Ap—0 to 12 inches, reddish-brown (5YR 4/4) silt loam; moderate, medium, granular structure; friable when moist, nonsticky and nonplastic when wet; neutral; clear, smooth boundary.

B1t—12 to 15 inches, yellowish-red (5YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; thin, continuous clay films on ped faces; neutral (limed); clear, wavy boundary.

B21t—15 to 22 inches, yellowish-red (5YR 4/8) silty clay loam that has few, fine, faint mottles of yellowish red (5YR 5/6); weak, medium, prismatic structure that breaks to moderate, medium, blocky; friable when moist, slightly sticky and nonplastic when wet; thick, continuous clay films on ped faces; strongly acid; gradual, wavy boundary.

B22t—22 to 33 inches, strong-brown (7.5YR 5/6) silty clay loam that has many, medium, distinct mottles of light brown (7.5YR 6/4) and light reddish brown (5YR 6/3); moderate, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; continuous clay films on ped faces; strongly acid; gradual, wavy boundary.

Bx1—33 to 42 inches, yellowish-red (5YR 4/8) clay loam that has many, medium, distinct mottles of pinkish gray (5YR 6/2) and yellowish red (5YR 5/6); moderate, very thick, platy structure that breaks to moderate, fine, blocky; firm and brittle when moist, slightly sticky and slightly plastic when wet; thin, continuous clay films on ped faces; strongly acid; gradual, irregular boundary.

Bx2—42 to 50 inches, dark-red (2.5YR 3/6) shaly clay loam; moderate, thick, platy structure; firm when moist, slightly sticky and nonplastic when wet; thin, patchy clay films on ped faces; 40 to 50 percent, by volume, is coarse fragments; strongly acid; clear, wavy boundary.

R—50 inches +, dusky-red (2.5YR 3/2), partly weathered shale.

The B21t and B22t horizons range from silt loam to silty clay loam. They range from 7.5YR to 5YR in hue. The Bx2 horizon is 10 to 50 percent coarse fragments, by volume. Depth to bedrock ranges from 3½ to 5 feet.

The Readington soils are associated with the Penn and Croton soils. In the Readington soils depth to mottling is between 15 and 30 inches, but the well-drained Penn soils are free of mottles and the poorly drained, grayish Croton soils are mottled near the surface.

Readington silt loam, 3 to 8 percent slopes, moderately eroded (RdB2).—This soil has the profile described as typical for the series.

Included with this soil in mapping are small areas where slopes are less than 3 percent and there is little or no erosion. Also included are a few severely eroded areas where erosion has removed more than 75 percent of the original surface layer.

The main management concerns on this soil are erosion on long slopes and the seasonal high water table. Practices are needed that control erosion and lower the seasonal high water table. (Capability unit IIe–5)

Riverwash

Riverwash (Rv) consists mostly of coal screenings, or culm, that have been deposited along streams by floodwaters. These deposits range from 8 inches to 5 feet in thickness. They occur mainly along Wiconisco Creek in the northern part of Dauphin County and along Swatara Creek in the southern part. The deposits along Wiconisco Creek are thicker and cover larger areas than those along Swatara Creek. Riverwash also occurs in small areas on islands in the Susquehanna River and in these areas consists of coal screenings and sand mixed with gravel. Rock crops out on a few of the small islands.

In some places parts of the thicker deposits have been removed by loading equipment and hauled by truck to powerplants where the screenings are used for fuel. About the only plants that grow on Riverwash are trees and shrubs. (Capability unit VIIw–2)

Strip Mine Spoil

Strip mine spoil (St) consists of overburden, or material that was removed so that the coal underneath could be mined. In Dauphin County strip mining occurs only in the northeastern part on the tops and side slopes of high ridges that extend to Schuylkill County. The overburden is mostly soil material that formed from weathered sandstone and shale. It has been dug by heavy machines and placed in mounds or ridges away from the coal vein. In removing the material, it is thoroughly mixed and is variable. Most areas of Strip mine spoil revegetate naturally from the seeds of nearby trees and shrubs. Because the material is loose and porous, there is little or no hazard of erosion. (Capability unit not assigned)

Tioga Series

The Tioga series consists of deep, nearly level, well-drained soils on flood plains and high bottoms along the Susquehanna River and Swatara Creek (fig. 6). These soils formed in alluvial deposits from various rocks, such as sandstone, limestone, and shale.

In a typical profile the plow layer is dark-brown fine sandy loam about 9 inches thick. The next layer, about 5 inches thick, is dark yellowish-brown loam. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish-brown fine sandy loam, and the lower part is dark yellowish-brown loam.

Tioga soils have moderate permeability, rapid internal drainage, and moderate available moisture capacity. These soils are subject to flooding.

The native vegetation on Tioga soils consisted of oak, maple, tulip-poplar, and hickory. Most areas have been cleared and are used for all general farm crops and truck crops grown in the county. These soils are important to farming in Dauphin County.

Typical profile of Tioga fine sandy loam in a nearly level, idle area, one-quarter mile east of Amity Hall:

Ap—0 to 9 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; friable when moist; slightly acid; clear, smooth boundary.

A2—9 to 14 inches, dark yellowish-brown (10YR 3/4) loam; weak, medium, granular structure; friable when moist; medium acid; clear, wavy boundary.

B21—14 to 26 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, subangular blocky structure; friable when moist; slightly acid; gradual, wavy boundary.

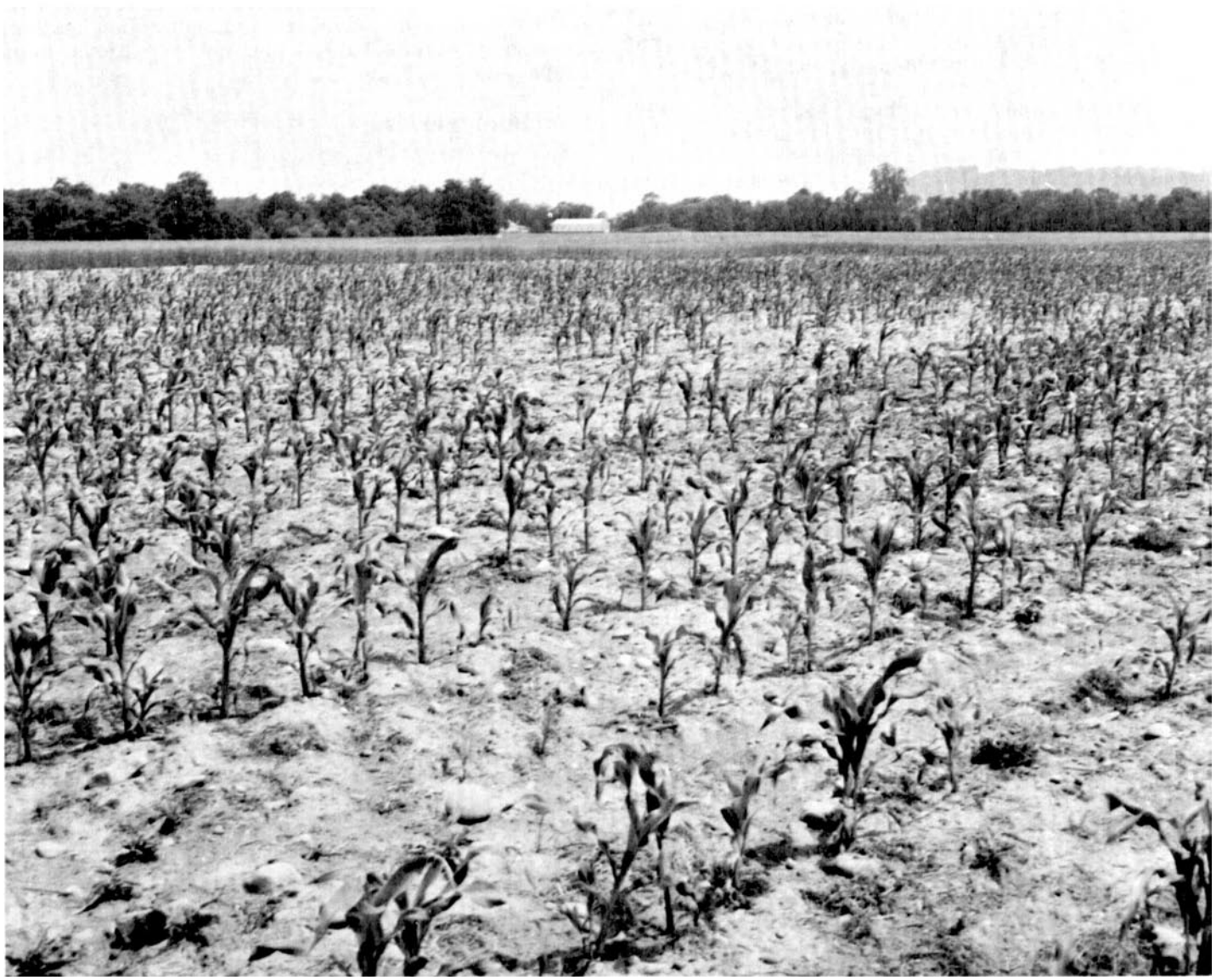


Figure 6.—Typical landscape of Tioga fine sandy loam on island in the Susquehanna River. Corn grows in foreground, wheat in background.

B22—26 to 60 inches +, dark yellowish-brown (10YR 4/4) loam; moderate, fine, subangular blocky structure; friable when moist; slightly acid.

The Ap horizon ranges from 8 to 12 inches in thickness. In many places the B2 horizon is stratified by sand, silt, and clay, and color ranges from yellowish brown to reddish brown. In some places a water table is at a depth of about 40 inches, but normally it is at a depth of more than 48 inches. Depth to waterworn gravel normally is more than 8 feet.

The Tioga soils are associated with the Lindside soils. They are free of mottles to a depth of 36 inches and depth to the high water table is greater than that in the Lindside soils, which are free of mottles at a depth ranging from 15 to 30 inches.

Tioga fine sandy loam (Ta).—This soil is nearly level and occurs in areas along streams where erosion is slight. It has the profile described as typical for the series. Included with this soil in mapping are a few acres where soil texture is slightly finer than is typical. Some areas are in pasture and hay, but most areas of this soil are used for general farm crops and truck crops. The main management concerns are flooding and maintaining the organic-matter content. (Capability unit IIs–1)

Tioga fine sandy loam, high bottom (Tg).—This soil is nearly level and occurs on high bottoms or low stream terraces that normally are above floodwaters. Included with this soil in mapping are several areas where the surface layer is silt loam. The main concern in managing this soil is maintaining the organic-matter content. Water for irrigation generally is available in nearby streams. (Capability unit IIs–1)

Urban Land

Urban land consists of areas that, during the development of industrial and housing sites, have been changed so much that soils cannot be classified. Areas of this land are the sites of quarries, airports, golf courses, railroad yards, and cities and towns that are so densely populated that soils cannot be identified.

Urban land, alluvial materials (Ua).—This miscellaneous land type consists of alluvial areas where the profile of the soil has been destroyed or covered with various materials by earthmoving equipment. Other areas are so densely populated that it is impossible to obtain sufficient samples for proper soil classification. (Capability unit not assigned)

Urban land, limestone materials (Ub).—This mapping unit consists mainly of leveled and cropped overburden from limestone quarries. Other areas of this land are so densely populated that it is impossible to obtain sufficient samples for proper soil classification. (Capability unit not assigned)

Urban land, shale materials (Us).—This miscellaneous land type consists mainly of shale materials that have been used for land fill or for land leveling. Other areas are quarries or are so densely populated that it is not possible to obtain sufficient samples for soil classification. (Capability unit not assigned)

Very Stony Land, Sloping

Very stony land, sloping (VsC) is gently sloping to sloping and occurs in areas where stones and boulders cover the soil surface and are in the soil material. In most places the stones are so close together that little soil material is between them. A few trees grow in these areas but generally are not of commercial value. Included with the land in the mapping are two or three small areas of rubble land, or land covered with big boulders. These included areas are barren.

Very stony land, sloping, is not suited to commercial forests. It is suitable for limited use as wildlife habitat. (Capability unit VIIIs–1)

Very Stony Land, Steep

Very stony land, steep (VsF) has thin soil material, and on the surface are solid bedrock and stones of quartzite, sandstone, and conglomerate. These stones may be as large as boulders, and they resist weathering. A few trees of commercial value grow, but they grow so slowly and their number is so small that harvesting is not worthwhile. This mapping unit has limited use as wildlife habitat and for recreational uses. (Capability unit VIIIs–1)

Watchung Series

The Watchung series consists of deep, nearly level, poorly drained soils on uplands. These soils occupy low-lying areas and depressions in Londonderry and Conewago Townships in the southern part of Dauphin County. They formed in material weathered from diabase of the Triassic age.

In a typical profile the surface layer is very dark brown silt loam about 2 inches thick. The next layer is grayish-brown silt loam about 6 inches thick. The subsoil extends to a depth of about 37 inches and is grayish-brown silty clay loam and clay loam in the upper part and light brownish-gray silty clay loam in the lower part. The subsoil is mottled throughout with brownish and grayish colors. The underlying material is light olive-gray clay loam mottled with dark brown. Diabase bedrock occurs at a depth of about 48 inches.

The Watchung soils have slow permeability and moderate available moisture capacity.

The native vegetation on these soils consisted of mixed hardwoods. Cleared areas are used for pasture or hay.

Typical profile of Watchung silt loam that has a slope of 0 to 2 percent, one-half mile northwest of Round Top in Londonderry Township:

A1—0 to 2 inches, very dark brown (10YR 2/2) silt loam; weak, fine granular structure; friable when moist; strongly acid; clear, smooth boundary.

A2—2 to 8 inches, grayish-brown (10YR 5/2) silt loam that has few, fine, faint mottles of light brownish gray (2.5Y 6/2); weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; medium acid; clear, wavy boundary.

B21tg—8 to 13 inches, grayish-brown (2.5Y 5/2) silty clay loam that has common, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, medium, blocky structure; friable when moist, sticky and slightly plastic when wet; continuous clay films on ped faces; slightly acid; gradual, wavy boundary.

B22tg—13 to 24 inches, grayish-brown (2.5Y 5/2) clay loam that has many, medium, distinct mottles of

brown (10YR 5/3); moderate, medium, blocky structure; friable when moist, sticky and plastic when wet; continuous clay films and few black coatings on ped faces; slightly acid; gradual, wavy boundary.

B23tg—24 to 37 inches, light brownish-gray (10YR 6/2) silty clay loam that has common, medium, prominent mottles of strong brown (7.5YR 5/6); moderate, medium, prismatic structure; friable when moist, sticky and plastic when wet; thin clay films on ped faces; slightly acid; clear, wavy boundary.

C—37 to 48 inches, light olive gray (5Y 6/2) clay loam that has few, medium, distinct mottles of dark brown (10YR 3/3); moderate, medium, blocky structure; friable when moist, sticky and slightly plastic when wet; slightly acid; abrupt, wavy boundary.

R—48 inches +, diabase bedrock.

The A1 and A2 horizons each ranges from very dark brown to very dark gray and grayish brown. Depth to mottling ranges from 0 to 6 inches. Reaction in the A2 horizon ranges from strongly acid to medium acid. The B21tg, B22tg, and B23tg horizons each ranges from silty clay loam to clay loam, and the B22tg and the B23tg range from strongly acid to slightly acid. Depth to bedrock ranges from 48 to 72 inches.

The Watchung soils are adjacent to the Lehigh soils. The Watchung soils are poorly drained and have mottles within a depth of 6 inches from the surface, but the Lehigh soils are moderately well drained and are free of mottles above a depth of 12 inches.

Watchung silt loam (Wa).—This nearly level soil occurs in areas where erosion is only a slight hazard. It has the profile described as typical for the series. Included with this soil in mapping are a few small areas where slopes are steeper than nearly level and the surface layer thinner than that in the typical profile.

Watchung silt loam is too wet for cultivation because most areas are so nearly level and the profile is so compact that runoff and internal drainage are too slow for proper drainage. This soil is suited to pasture if water-tolerant grasses and legumes are seeded. Practices are needed to remove excess surface water. (Capability unit Vw–1)

Watchung very stony silt loam (Wc).—This soil has a profile similar to that described as typical for the series, except that on the surface of this soil are many stones. The erosion hazard is slight. Included with this soil in mapping are a few areas where slopes are steeper.

This very stony silt loam is too wet and stony to be cultivated. It is used for pasture, trees, or wildlife habitat. (Capability unit VIIs–2)

Weikert Series

The Weikert series consists of shallow, sloping to steep, well-drained, shaly soils on uplands. These soils occupy ridgetops and side slopes in the shale and sandstone area east of Harrisburg. Weikert soils formed in material weathered from gray shale and sandstone.

In a typical profile the plow layer, about 5 inches thick, is light brownish-gray shaly silt loam and is 20 percent coarse fragments, by volume. The next layer, about 2 inches thick, is light yellowish-brown shaly silt loam and is 35 to 40 percent coarse fragments, by volume. The underlying material, about 60 percent coarse fragments, by volume, is yellowish-brown very shaly silt loam. Olive shale is at a depth of 15 inches.

Weikert soils have moderately rapid permeability and low available moisture capacity.

The native vegetation on these soils consisted of mixed hardwoods. Most cleared areas are used for pasture and hay, but in many places use is determined by use of the adjacent soils.

Typical profile of Weikert shaly silt loam, 5 to 15 percent slopes, moderately eroded, 1 mile north of Colonial Park Shopping Center on a road cut in a housing development 500 feet north of Earl Drive:

Ap—0 to 5 inches, light brownish-gray (10YR 6/2) shaly silt loam; weak, fine, granular structure; friable when moist; 20 percent, by volume, is coarse fragments; medium acid; clear, wavy boundary.

A2—5 to 7 inches, light yellowish-brown (10YR 6/4) shaly silt loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; 35 to 40 percent, by volume, is coarse fragments; medium acid; clear, wavy boundary.

C—7 to 15 inches, yellowish-brown (10YR 5/8) very shaly silt loam; moderate, medium, subangular blocky structure; firm when moist, slightly sticky when wet; 60 percent, by volume, is coarse fragments; clear, irregular boundary.

R—15 inches +, olive (5Y 4/3) shale bedrock.

The A2 horizon ranges from shaly silt loam to shaly clay loam. In the C horizon shale fragments range from 35 to 60 percent, by volume. Depth to bedrock ranges from 12 to 20 inches.

The Weikert soils are adjacent to the Berks and Comly soils. The Weikert soils are more shallow and have a lower available moisture capacity than the Berks soils. Weikert soils are well drained, but the Comly soils are only moderately well drained and depth to mottling ranges from 18 and 30 inches.

Weikert shaly silt loam, 5 to 15 percent slopes, moderately eroded (WeC2).—This soil has the profile described as typical for the series. Included with it in mapping are several small areas where erosion has removed more than 75 percent of the original surface layer. Most areas of this soil are used for general farm crops and pasture. The main management concerns are shallowness to bedrock, low organic-matter content, and medium runoff. Practices that control surface water are needed to reduce erosion. (Capability unit IVe–2)

Weikert shaly silt loam, 15 to 25 percent slopes, moderately eroded (WeD2).—Except that this soil is more shallow to bedrock, it has a profile similar to the one described as typical for the series. Included with this soil in mapping are a few small areas where erosion has removed more than 75 percent of the original surface layer.

Reducing erosion and maintaining the organic-matter content in the surface layer are the main concerns in managing this soil. Because this soil is so shallow to bedrock and has low available moisture capacity, it is better suited to pasture, long term hay, or trees than to general farm crops. (Capability unit VIe–1)

Weikert shaly silt loam, 25 to 40 percent slopes, moderately eroded (WeE2)—This soil occurs on side slopes adjacent to small streams and valleys where runoff is rapid. It has a profile similar to the one described as typical for the series except that it is more shallow to shale bedrock.

Included with this soil in mapping are a few acres where the subsoil is red and the profile is slightly thicker than that of this soil. Also included are several areas where a thin, organic layer is on the surface and the profile is thicker than that of this soil. Other inclusions are small areas where erosion has removed almost all of the original surface layer.

This soil is too shallow to bedrock, too steep, and too susceptible to erosion for cultivation. It is better suited to trees and shrubs for wildlife use than to crops. Use for pasture is limited. (Capability unit VIIe–1)

Formation and Classification of Soils

The first part of this section tells how the soils of Dauphin County were formed and describes the factors that influence soil formation. The second part deals with the classification of soils.

Soil formation begins with the physical weathering of rock. Large pieces of rock are broken into smaller pieces by frost wedging, differential expansion, unloading, collodial plucking, hydration, and other natural forces. Eventually, the rock and its fragments are reduced to particles of sand and silt. This unconsolidated soil material is in a layer in which plants take root and grow. As the plants mature and die, they form a mat on the surface, as can be seen on the Laidig, Dekalb, and other forested soils. The upper part of the mat consists of relatively fresh leaves and twigs, and the lower part, directly above the mineral soil, is well-rotted humus. From this mat organic matter is added to the mineral soil.

During the weathering process, minerals decompose and are leached out in solution. The result of this leaching is noticeable in the Hagerstown and other soils derived from limestone. From these soils calcium carbonate has been lost, and applications of lime are needed to return the soils to a level of reaction suitable for plant growth.

The minerals in a soil are taken into plants by their roots, and they help to form leaves and stems that eventually fall to the ground, decay, and return part of the nutrients to the soil. Then the cycle begins again and is repeated. As the cycles continue, the soil matures and fine particles, such as clay, form and tend to accumulate in the subsoil. The supply of available nutrients is reduced, and additions of fertilizer are needed to replace the nutrients.

Factors of Soil Formation

Soils are complex mixtures of weathered rock, primary and secondary minerals, organic matter, water, and air. These components are present in varying quantities. The characteristics, or properties, of all soils depend on (1) the physical and mineralogical composition of the parent material; (2) the climate under which the parent material has accumulated and existed; (3) the plant and animal life in the area; (4) the relief or lay of the land; and (5) the length of time the parent material has been exposed to the effects of the other factors. The importance of each factor differs from place to place. Occasionally one factor dominates and fixes most of the characteristics of a soil. Normally, however, the interaction of all five factors determines the kind of soil that develops in any given place.

Parent material

The parent material of soils in Dauphin County was weathered in place from many kinds of rocks or was transported by water and wind and deposited in varying proportions to become an unconsolidated layer of clay, silt, sand, and gravel.

Most of the soils in the county developed in place from material weathered from rock and are called residual soils. Many of the differences among such soils are related directly to variations among the various parent rocks. The Hagerstown and Duffield soils formed in material weathered from limestone. The Bedington, Berks, Comly, and Brinkerton soils formed in material weathered from gray shale and sandstone. The Dekalb and Lehew soils developed in material weathered from medium-grained to coarse-grained sandstone on high ridges and steep slopes in the county. The Calvin, Leck Kill, and Klinesville soils, which occur in the northern half of the county, formed in material derived from acid, red shale and sandstone. The red shale and sandstone in the southern part of the county gave origin to the parent material of the Penn and Athol soils. The stony Neshaminy soils formed in material weathered from diabase, an intrusive igneous rock.

The parent material of nonresidual soils in the county was made up of sediments that were transported by water, gravity, or wind. Duncannon and Lawrenceville soils developed in windblown fine sands and silts on terrace-like areas along the Susquehanna River. The Andover, Buchanan, and Laidig soils developed in colluvial materials that were deposited at the base of ridges in the northern half of Dauphin County.

The most recently deposited alluvium is on the flood plains where soils, such as Atkins, Philo, Basher, Barbour, Huntington, Lindside, and Tioga developed. Chavies soils formed in older alluvial deposits on terraces above the flood plains.

Climate

The climate of Dauphin County is humid and temperate. It affects the formation of soils through its influence on the rate at which rock weathers and minerals and organic matter decompose.

The climate is fairly uniform throughout the county, except in the northern part where it is a few degrees cooler on the mountain ridges and where the amount of rainfall probably is higher than in the southern half. Moisture has played an important part in soil development through the years. Most soils in the county are highly leached and are strongly acid. Even the soils formed in place from weathered limestone are acid and require large amounts of lime if crops are to grow well.

Plant and animal life

Plants, micro-organisms, earthworms, and other forms of life are active in the development of soils. They bring about changes that depend mainly on the life processes peculiar to each.

The soils of Dauphin County developed under a forest cover of hardwoods. The principal hardwoods now growing in the county are red, white, black, and chestnut oaks, hickory, beech, birch, walnut, yellow-poplar, ash, maple, and dogwood. A few pine trees are scattered on the mountain ridges and steep slopes. The undergrowth consists of young oak and of chestnut, dogwood, maple-leaf viburnum, huckleberry, laurel, spicewood greenbrier, and honeysuckle.

Decayed leaves, twigs, roots, and at times entire plants add much organic matter to soils formed under forest cover. Most of this plant material accumulates on the surface, where it is acted on by the micro-organisms, earthworms, and other forms of life. The plant material also is affected by direct chemical reactions to climate. This process of decomposition releases plant nutrients for new plant and animal growth.

In depressions and low-lying areas organic matter accumulates faster but decomposes more slowly than organic matter on steep slopes. Thus, soils of the lowlands are richer in organic matter and are more fertile than soils on steep slopes.

In some areas where bodies of shallow water occurred, the plant materials accumulated to form the muck soils.

Relief

Relief, through its control of natural drainage, is a modifying factor in the formation of soils and the rate of erosion. In general, the steepness of slope is closely related to the depth of soil. The rate at which water moves through the profile is governed, to a large extent, by the steepness of a soil, which in turn affects drainage and the weathering and leaching of soil minerals.

The elevation in Dauphin County ranges from less than 300 feet at a point south of Middletown to more than 1,700 feet north of Williamstown at the northeastern corner of the county. The northern half of the county is characterized by the ridge and valley section of the greater Appalachian Mountain system. The area between mountain ranges varies from 1 to 5 miles in width and from 600 to 700 feet in elevation. Erosion has continued through the centuries until many small stream valleys have formed where the shale and sandstone have weathered most rapidly.

The southern half of Dauphin County, beginning south of Blue Mountain and extending southward to Lancaster County, is the Piedmont Lowlands. These lowlands are underlain by Martinsburg shale and limestone and by the Triassic formations. Most streams that drain the area flow in a southerly direction and empty into Swatara Creek, which joins the Susquehanna River at Middletown. The slopes are mostly gentle to moderate.

The Susquehanna River forms the western boundary of Dauphin County. The flood plain along this river generally is not wide. Where the river cuts through the mountain ranges in the northern part of the county, there is little or no flood plain and slopes are very steep and precipitous.

Time

Time accounts for some of the differences among soils. Two soils that formed in similar parent material, and that have similar relief, vegetation, and climate may vary greatly in characteristics because of a difference in the length of time the soil-forming processes have been active. In Dauphin County most of the soils on the uplands have had sufficient time to develop distinct horizons, and are said, therefore, to be old or mature. Because of the moderately high rainfall and favorable relief and temperature, these soils have matured fairly rapidly. In contrast, the soils of the flood plains are said to be young because sediments are still being deposited and there has not been enough time for well-defined horizons to develop.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics, assemble knowledge about them, see their relationship to each other and to the whole environment, and develop principles that will help us to understand their behavior and response to manipulations. First through classification and then through use of soil maps, we can apply our knowledge of soils to specific fields or to other tracts of land.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and was later revised (*15*). The system currently used was adopted by the National Cooperative Soil Survey in March 1967. This system is under continual study. Readers interested in the development of the system should refer to the latest literature available (*13, 20*).

The current system of classification defines the classes in terms of observable and measurable properties of soils. It permits grouping of soils that are similar to morphology and genesis and is designed to accommodate all soils. It has six categories. Beginning with the most inclusive, the categories are the order, the suborder, the great group, the subgroup, the family, and the series. The placement of some soil series in the current system, particularly in families, may change as more precise information becomes available. In table 10 the soils of Dauphin County are classified according to some categories in the current system and according to great soil groups in the 1938 system. Following are brief descriptions of the six categories in the current system.

ORDER.—Ten soil orders are recognized: Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions are the Entisols and the Histosols, which occur in many different climates. The five orders in Dauphin County are Alfisols, Histosols, Inceptisols, Mollisols, and Ultisols.

TABLE 10.—*Classification of the soils*

[The families and subgroups within the Histosol order are not given, because they had not been fully developed and tested when soils in this county were mapped and described]

Series	Family	Subgroup	Order	1938 classification
				Great soil group
Albrights	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols	Red-Yellow intergrading to Gray-Brown Podzolic soils.
Andover	Fine-loamy, mixed, mesic	Typic Fragiaquults	Ultisols	Low-Humic Gley soils.
Armagh	Clayey, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Athol	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Atkins	Fine-loamy, mixed, acid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Barbour	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic.	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Basher	Coarse-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils.
Bedington	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Berks	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides intergrading to Lithosols.
Brecknock	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Brinkerton	Fine-silty, mixed, mesic	Typic Fragiaqualfs	Alfisols	Low-Humic Gley soils.
Buchanan	Fine-loamy, mixed, mesic	Aquic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Calvin	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Captina	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils.
Chavies	Coarse-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Comly	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Croton	Fine-silty, mixed, mesic	Typic Fragiaqualfs	Alfisols	Low-Humic Gley soils.
Dekalb	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Duffield	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Duncannon	Coarse-silty, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Regosols.
Hagerstown	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Huntington	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Klinesville	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Laidig	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Lawrenceville	Coarse-silty, mixed, mesic	Aquic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils.
Leck Kill	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow intergrading to Gray-Brown Podzolic soils.
Lehew	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Lehigh	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Planosols.
Lewisberry	Coarse-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Lindside	Fine-silty, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Muck			Histosols	Bog soils.
Neshaminy	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils intergrading to Reddish-Brown Lateritic soils.
Penn	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Philo	Coarse-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils.
Readington	Fine-loamy, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown intergrading to Red-Yellow Podzolic soils.
Tioga	Coarse-loamy, mixed, mesic	Dystric Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Watchung	Fine, mixed, mesic	Typic Ochraqualfs	Alfisols	Planosols.
Weikert	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols intergrading to Sols Bruns Acides.

Alfisols formed mostly under trees, but some formed under grass. They are light colored and have a base saturation of more than 35 percent. The base saturation increases with depth.

Histosols formed from organic materials in bodies of shallow water. This order consists of organic soils, but the other four orders in the county are mineral soils.

Inceptisols generally form on young, but not recent, land surfaces. These soils have weakly developed or incipient horizons.

Mollisols formed mostly under grass. They have a thick, friable, dark-colored surface layer. Base saturation is more than 50 percent.

Ultisols have a clay-enriched B horizon that has less than 35 percent base saturation, and the base saturation decreases with depth. Those that formed under grass are likely to have an acid reaction, a dark-colored surface layer less than 10 inches thick, and strongly developed horizons.

SUBORDER.—Each order is divided into suborders, primarily on the basis of soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range allowed in the orders. The soil properties used to separate the suborders are those that reflect the presence or absence of waterlogging, or those that reflect soil differences resulting from climate or vegetation. (The suborders are not shown separately in table 10, because they are identified by the last part of the second word in the name of the subgroup.)

GREAT GROUP.—Each suborder is divided into great groups on the basis of smilarity in the kinds and sequence of major horizons and features. The horizons used to make separations are those in which clay, iron, and humus have accumulated, or those that have pans that interfere with the growth of roots or the movement of water. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition, and the like. (The great groups are not shown separately in table 10 because they are indicated by the last word in the name of the subgroup.)

SUBGROUP.—Each great group is divided into subgroups. The soils in one of the subgroups represent the central, or typic, segment of the group; those in other subgroups, called intergrades, have mainly the properties of another great group, suborder, or order. Some subgroups are made up of soils having properties that intergrade outside the range of any recognized great group, suborder, or order.

FAMILY.—Families are established within a subgroup primarily on the basis of properties important in the growth of plants or in the behavior of soils when they are used for engineering. These properties include texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence.

Laboratory Data[5]

[5] Laboratory analyses and interpretations were made at the Soil Characterization Laboratory of the Pennsylvania State University by R. P. MATELSKI, R. L. CUNNINGHAM, G. W. PETERSON and staff. Determinations and interpretations of clay minerals were made by L. J. JOHNSON.

The physical and chemical properties of soils in the Bedington, Calvin, Chavies, Comly, and Hagerstown series are given in tables 11 and 12. The profiles of these soils are described in the section "Descriptions of the Soils."

These soils were selected for characterization because they are typical of some of the most common soils mapped in the county. Sites were selected for each soil, a pit dug through the solum into the parent material, and samples collected from each recognizable horizon for laboratory characterization. Selected horizons were also sampled for engineering tests made by the Soil Testing Laboratory of the Pennsylvania Department of Highways. Results of these tests are reported in table 4 in the section "Engineering Uses of Soils."

Methods of Analyses

Samples of each horizon were air-dried, crushed carefully with a rolling pin to avoid crushing any nonsoil material, and passed through a series of sieves to determine the percentage of the various sizes of coarse fragments by weight. The soil material that passed through the 2-millimeter sieve was then used for all laboratory determinations, except for bulk density and moisture retained at 1/3 atmosphere tension.

Particle size analyses were made by the pipette method described by Kilmer and Alexander (*6*) and modified by suggestions of Kilmer and Mullins that provided use of sodium hexametaphosphate as the dispersing agent (*7*).

Bulk density was determined on 1-inch by 2-inch cylindrical core samples taken with a modified Uhland (*16, 19*) core sampler. The results were reported in grams per cubic centimeter.

Moisture retained at 1/3 atmosphere tension was determined on core samples by using the pressure plate apparatus (*11*). Moisture retained at 15 atmospheres tension was determined on fragmented samples by using the pressure plate and pressure membrane apparatus (*10*) as outlined in USDA Handbook No. 60 (*19*).

The pH was determined on a 1:1 soil-water ratio by using a glass electrode. Using a modification of the Walkley-Black method (*9*), organic carbon was determined by wet combustion. Total nitrogen was determined by the Kjeldahl method (*2*), modified by trapping ammonia in a boric acid solution and titrating with sulfuric acid.

Sodium, potassium, calcium, and magnesium were extracted with neutral normal ammonium acetate (*9*). Extractable sodium and potassium were determined on a Beckman flame spectrophotometer, and extractable calcium and magnesium were determined by titration (*9*). Titration of a buffered barium chloride solution with triethanolamine was used to determine exchangeabile acidity (*8*). Cation exchange capacity was determined by totaling the extractable cations and exchangeable acidity.

TABLE 11.—*Physical*

[Laboratory analyses made at the Soil Characterization Laboratory of the Pennsylvania State

Soil name and sample number	Horizon	Depth	Particle size distribution			
			Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)
		Inches	*Percent*	*Percent*	*Percent*	*Percent*
Bedington shaly silt loam:						
S64-Pa-22-5-1	Ap	0–10	3.6	2.7	6.9	9.9
S64-Pa-22-5-2	Bl	10–13	7.7	6.4	5.3	4.9
S64-Pa-22-5-3	B21t	13–19	6.4	6.5	4.9	4.8
S64-Pa-22-5-4	B22t	19–29	8.3	7.1	5.8	5.2
S64-Pa-22-5-5	B23t	29–33	4.6	5.9	6.4	6.0
S64-Pa-22-5-6	B24t	33–42	14.9	10.0	6.8	6.3
S64-Pa-22-5-7	B3t	42–50	19.1	13.0	8.6	7.4
S64-Pa-22-5-8	Cl	50–61	15.4	11.7	8.4	7.7
S64-Pa-22-5-9	C2	61–68	14.8	15.3	12.2	8.9
Calvin shaly silt loam:						
S64-Pa-22-3-1	Ap	0–9	7.7	5.1	2.2	3.3
S64-Pa-22-3-2	B21	9–15	12.0	6.3	3.4	3.9
S64-Pa-22-3-3	B22	15–21	15.2	9.3	13.5	5.6
S64-Pa-22-3-4	B3	21–27	8.2	7.2	5.5	6.4
Chavies fine sandy loam:						
S64-Pa-22-2-1	Ap	0–9	.2	2.2	15.7	19.9
S64-Pa-22-2-2	A&B	9–12	.2	1.9	14.1	19.9
S64-Pa-22-2-3	B21t	12–19	.2	1.8	16.4	21.2
S54-Pa-22-2-4	B22t	19–24	.3	2.3	18.9	24.2
S64-Pa-22-2-5	B23t	24–28	.7	3.6	21.9	27.0
S64-Pa-22-2-6	Cl	28–33	.3	3.6	23.9	32.9
S64-Pa-22-2-7	C2	33–39	.8	3.7	27.3	28.3
S64-Pa-22-2-8	C3	39–43	.6	1.2	15.2	34.6
S64-Pa-22-2-9	C4	43–49	.4	2.1	12.8	27.7
S64-Pa-22-2-10	C5	49–61	.6	3.7	11.4	27.9
S64-Pa-22-2-11	C6	61–66	.8	2.2	15.2	28.4
S64-Pa-22-2-12	IIC7	66–78	2.6	14.2	46.8	23.4
S64-Pa-22-2-13	IIC8	78–84	14.3	18.3	30.4	17.9
Comly silt loam:						
S64-Pa-22-9-1	Ap	0–9	1.3	2.6	5.8	8.6
S64-Pa-22-9-2	A3	9–13	.5	1.6	4.2	5.8
S64-Pa-22-9-3	B21t	13–18	.9	1.6	3.7	5.8
S64-Pa-22-9-4	B22t	18–23	4.9	4.1	5.8	7.6
S64-Pa-22-9-5	Bxl	23–30	5.5	6.3	9.6	13.2
S64-Pa-22-9-6	Bx2	30–34	9.1	9.3	9.8	11.3
S64-Pa-22-9-7	Bx3	34–44	16.9	16.5	9.9	7.3
S64-Pa-22-9-8	R	44–52	18.2	18.2	11.5	8.1
Hagerstown silt loam:						
S64-Pa-22-6-1	Ap	0–9	1.5	3.1	5.3	6.0
S64-Pa-22-6-2	Bl	9–15	1.3	2.0	3.2	3.6
S64-Pa-22-6-3	B21t	15–25	2.5	2.6	4.4	5.2
S64-Pa-22-6-4	B22t	25–29	4.5	4.5	7.6	8.2
S64-Pa-22-6-5	B23t	29–35	1.3	1.5	2.3	2.4
S64-Pa-22-6-6	B24t	35–43	.3	.6	.7	.6
S64-Pa-22-6-7	B25t	43–58	.1	.2	.2	.3
S64-Pa-22-6-8	B3t	58–60	.3	.4	.7	.4
S64-Pa-22-6-9	C	60–64	.9	.5	.6	.8

properties of selected soils

University. Absence of data indicates determination was not made or material was not present]

Particle size distribution—Continued			Coarse fragments larger than 2.0 mm.	Bulk density (core)	Moisture held at—		Available moisture
Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)			Tension of ⅓ atmosphere (core)	Tension of 15 atmospheres (fragmented)	
Percent	*Percent*	*Percent*	*Percent by weight*	*Gm./cc.*	*Percent*	*Percent*	*Inches per inch*
10.0	53.1	13.8	32.7	1.13	26.3	12.2	0.16
4.5	41.7	29.5	51.9	1.41	22.6	12.8	.14
4.4	28.0	44.8	47.5	1.33	24.3	20.0	.06
4.6	24.4	44.6	51.8	1.29	27.7	22.8	.06
5.6	34.6	36.9	46.2	1.36	27.7	18.9	.12
6.5	21.3	34.2	51.7	1.45	25.1	21.0	.06
6.3	17.8	27.8	89.0	1.52	20.5	17.6	.04
7.0	21.5	28.3	68.6	1.40	26.1	19.3	.10
6.7	15.5	26.6	64.6	1.40	22.6	18.9	.....
7.2	59.7	14.8	36.0	1.24	22.2	8.8	.17
7.2	51.0	16.2	43.0	1.33	19.2	6.3	.17
8.8	27.4	20.2	69.0	1.54	18.4	7.5	.17
8.9	42.7	21.1	72.0	.....	.....	.....	.....
17.9	36.1	8.0	.6	1.33	14.6	4.8	.13
18.8	35.2	9.9	.1	1.46	14.3	4.5	.14
18.1	30.4	11.9	.7	1.50	13.8	5.3	.13
18.8	23.3	12.2	.7	1.51	12.8	5.3	.11
26.4	10.2	10.2	.8	1.52	11.1	4.9	.09
18.9	15.5	4.9	.7	1.51	8.9	3.3	.08
15.7	16.8	7.4	1.8	1.54	8.1	2.4	.09
22.7	18.5	7.2	2.1	1.49	10.9	3.0	.12
28.2	20.8	8.0	1.7	1.54	12.0	4.0	.12
27.1	19.9	9.4	6.8	1.48	12.3	3.8	.13
20.8	25.6	7.0	2.5	1.55	14.6	3.2	.18
6.3	4.1	2.6	13.4	1.39	2.8	1.7	.02
8.5	8.6	2.0	63.8	1.54	3.6	2.1	.02
8.8	56.4	16.5	2.5	1.32	21.9	12.0	.13
6.5	57.2	24.2	2.5	1.48	21.5	12.3	.14
6.7	49.4	31.9	.8	1.45	22.1	14.2	.11
7.6	42.9	27.1	2.8	1.46	22.6	12.8	.14
12.6	37.7	15.1	18.7	1.69	15.7	9.2	.11
12.1	33.6	14.8	31.1	1.75	14.8	12.8	.04
7.7	26.9	14.8	61.4	1.63	16.5	12.3	.07
6.4	23.3	14.3	.....	.....	.....	12.4	.....
5.7	62.2	16.2	2.7	1.33	22.7	10.2	.17
3.9	54.3	31.7	3.4	1.52	20.4	13.1	.11
6.0	45.3	34.0	5.2	1.51	21.2	15.0	.09
8.3	38.4	28.5	10.4	1.66	18.4	13.5	.08
2.0	14.3	76.2	4.4	1.48	27.3	25.5	.03
.7	4.9	92.2	.8	1.38	31.6	26.8	.07
.4	6.1	92.7	.2	1.34	33.7	27.8	.08
1.0	19.2	78.0	.3	1.28	34.5	25.7	.11
1.2	34.4	61.6	4.0	.....	.....	22.5	.....

383-854 O - 71 - 7

TABLE 12.—*Chemical*

[Laboratory analyses made at the Soil Characterization Laboratory of the Pennsylvania State

Soil name and sample number	Horizon	Depth	Organic carbon	Nitrogen	Carbon-nitrogen ratio	Calcium-magnesium ratio	Extractable cations (milliequivalents per 100 grams of soil)	
							Calcium	Magnesium
		Inches	*Percent*	*Percent*				
Bedington shaly silt loam:								
S64-Pa-22-5-1	Ap	0–10	2.33	0.26	9	14.1	16.9	1.2
S64-Pa-22-5-2	B1	10–13	.62	.09	6	11.3	11.3	1.0
S64-Pa-22-5-3	B21t	13–19	.37	.09	4	7.8	10.9	1.4
S64-Pa-22-5-4	B22t	19–29	.19				11.3	.9
S64-Pa-22-5-5	B23t	29–33	.16				9.9	.8
S64-Pa-22-5-6	B24t	33–42	.14				9.8	.8
S64-Pa-22-5-7	B3t	42–50	.11			8.7	10.4	1.2
S64-Pa-22-5-8	C1	50–61	.10			3.2	7.1	2.2
S64-Pa-22-5-9	C2	61–68	.12			2.5	5.6	2.2
Calvin shaly silt loam:								
S64-Pa-22-3-1	Ap	0–9	2.05	.19	10	6.0	7.2	1.2
S64-Pa-22-3-2	B21	9–15	.35	.05	7	4.9	5.9	1.2
S64-Pa-22-3-3	B22	15–21	.19	.04		2.6	5.1	2.0
S64-Pa-22-3-4	B3	21–27	.17	.05		2.7	3.8	1.4
Chavies fine sandy loam:								
S64-Pa-22-2-1	Ap	0–9	.93	.14	7		5.3	.7
S64-Pa-22-2-2	A&B	9–12	.38	.07	5		2.7	.7
S64-Pa-22-2-3	B21t	12–19	.17	.04			2.2	.6
S64-Pa-22-2-4	B22t	19–24	.17	.04			1.5	.5
S64-Pa-22-2-5	B23t	24–28	.16	.03			1.4	.5
S64-Pa-22-2-6	C1	28–33	.17				1.0	.8
S64-Pa-22-2-7	C2	33–39	.14				1.2	.7
S64-Pa-22-2-8	C3	39–43	.15				1.2	.7
S64-Pa-22-2-9	C4	43–49	.11				1.4	.9
S64-Pa-22-2-10	C5	49–61	.12				1.5	.8
S64-Pa-22-2-11	C6	61–66	.13				1.1	.9
S64-Pa-22-2-12	IIC7	66–78	.13				.7	.8
S64-Pa-22-2-13	IIC8	78–84	.14				.7	.9
Comly silt loam:								
S64-Pa-22-9-1	Ap	0–9	1.49	.17	9	4.4	8.7	2.0
S64-Pa-22-9-2	A3	9–13	.39	.06	6	5.7	7.4	1.3
S64-Pa-22-9-3	B21t	13–18	.24	.05		7.9	10.9	1.4
S64-Pa-22-9-4	B22t	18–23	.20	.04		9.0	11.7	1.3
S64-Pa-22-9-5	Bx1	23–30	.05			5.3	10.1	1.9
S64-Pa-22-9-6	Bx2	30–34	.09			3.5	10.9	3.1
S64-Pa-22-9-7	Bx3	34–44	.10			1.9	10.8	5.7
S64-Pa-22-9-8	R	44–52						
Hagerstown silt loam:								
S64-Pa-22-6-1	Ap	0–9	1.54	.18	9	5.0	10.6	2.1
S64-Pa-22-6-2	B1t	9–15	.30	.06	5	3.4	9.1	2.7
S64-Pa-22-6-3	B21t	15–25	.19	.04		3.7	10.3	2.8
S64-Pa-22-6-4	B22t	25–29	.17	.02		7.5	9.7	1.3
S64-Pa-22-6-5	B23t	29–35	.20	.06		6.0	13.8	2.3
S64-Pa-22-6-6	B24t	35–43	.23	.06		4.3	13.9	3.2
S64-Pa-22-6-7	B25t	43–58	.27	.06		2.5	12.1	4.9
S64-Pa-22-6-8	B3t	58–60	.43	.08		2.1	15.3	7.2
S64-Pa-22-6-9	C	60–64	.66	.07		2.0	16.7	8.2

properties of selected soils

University. Absence of data indicates the determination was not made or material was not present]

Extractable cations (milliequivalents per 100 grams of soil)—Continued			Cation exchange capacity (sum)	Base saturation (sum)	Reaction, field (electrometric)	Mineral composition of clay fraction					
Sodium	Potassium	Hydrogen (exchange acidity)				Kaolinite (7 A° spacing)	Illite (10 A° spacing)	Vermiculite (variable spacing)	Chlorite (14 A° spacing)	Montmorillonite (variable spacing)	Interstratified (variable spacing)
			Meq./100 gm.	*Percent*	*pH*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
0.1	1.1	2.8	22.1	87	7.2	15	45	25	5	.....	10
.1	.4	5.1	17.9	72	7.6	20	40	30	5	.....	5
.1	.3	4.0	16.7	76	7.6	30	40	15	5	.....	10
.1	.4	13.3	26.0	49	7.6	30	40	15	5	.....	10
.1	.4	13.8	25.0	45	7.4	30	40	15	5	.....	10
.1	.3	8.6	19.6	56	7.3	25	45	20	5	.....	5
<.1	.2	4.9	16.8	71	7.0	10	65	5	15	.....	5
<.1	.2	4.8	14.4	67	6.5	.....	.....	.....	.....	.....	.....
<.1	.3	8.2	16.4	50	6.0	.....	.....	.....	.....	.....	.....
<.1	.2	7.3	16.0	54	6.1	15	40	5	30	.....	10
<.1	.2	3.1	10.5	70	6.4	15	55	5	20	.....	5
.3	.3	2.5	10.2	75	5.1	20	60	.....	15	.....	5
<.1	.3	7.1	12.7	44	4.9	20	65	5	10	.....	.....
<.1	.2	3.5	9.8	64	6.5	10	30	35	5	.....	20
<.1	.1	3.6	7.2	50	6.8	10	40	30	5	.....	15
<.1	.1	2.5	5.5	55	6.5	10	70	10	5	.....	5
<.1	.1	3.4	5.6	39	5.4	10	70	15	5	.....	.....
.3	.2	1.4	3.8	63	5.2	10	35	50	.....	.....	5
<.1	.1	1.4	3.4	59	5.1	15	25	50	5	.....	5
<.1	.1	4.0	6.1	34	5.0	10	75	5	5	.....	5
<.1	.1	3.7	5.8	36	5.0	5	80	5	5	.....	5
<.1	.1	5.9	8.4	30	4.9	5	80	10	.....	.....	5
<.1	.1	5.9	8.4	30	4.9	5	75	15	.....	.....	5
<.1	.2	2.8	5.1	45	4.8	5	80	5	5	.....	5
<.1	.1	3.1	4.8	35	4.9	.....	.....	.....	.....	.....	.....
<.1	.1	4.0	5.8	31	4.8	.....	.....	.....	.....	.....	.....
.3	.5	10.2	21.7	53	6.6	20	25	20	5	.....	30
.2	.2	6.2	15.3	59	6.9	20	35	25	5	.....	10
.3	.4	1.4	14.4	90	6.8	15	55	25	.....	.....	5
.2	.2	5.8	19.2	70	7.0	10	65	15	.....	5	5
.3	.2	1.4	13.9	90	6.5	10	70	15	.....	5	.....
.2	.3	2.7	17.2	84	5.5	10	80	10	.....	.....	.....
.3	.5	10.7	28.0	62	5.6	10	80	10	.....	.....	.....
.....	.....	.....	.....	.....	5.7	.....	.....	.....	.....	.....	.....
.1	.5	4.8	18.1	73	6.6	20	30	25	10	5	10
.1	.3	4.5	16.7	73	7.0	20	40	20	5	5	10
.1	.2	4.5	17.9	75	7.2	30	45	10	5	5	5
.1	.2	1.4	12.7	89	7.0	20	50	15	5	5	5
.1	.3	6.5	23.0	72	6.4	20	50	15	5	5	5
.1	.2	6.8	24.2	72	5.0	25	45	15	5	5	5
.1	.3	9.3	26.7	65	4.9	20	50	20	5	5	.....
.1	.3	5.5	28.4	81	5.8	15	50	15	5	5	10
.1	.3	4.0	29.3	86	6.2	.....	.....	.....	.....	.....	.....

Clay minerals in selected horizons were identified on a Norelco X-ray spectrometer equipped with a Geiger counter and chart recorder using a copper target. Before X-ray analysis, the air-dry sieved samples were treated with 10 percent hydrogen peroxide to remove the organic matter. Iron oxides were removed by the method developed by Jeffries (*4*) and the iron determined by titration of a sodium dithionite extract with dichromate (*5*). Data on iron, however, are not reported in table 13. Clay samples (less than 0.002 millimeter) were then separated by centrifugation and oriented flatly as a thin film on a glass slide. The clay particles were then analyzed as magnesium saturated-ethylene glycol solvated specimens and as potassium saturated-water solvated specimens.

Discussion of Analyses

Analyses of the soils selected for characterization are discussed in the following pages. The results of the physical analyses can be used to check less accurate field determinations such as those for coarse "fragment and particle" size distribution. Physical analyses also supply information on the capacity of soils to store and supply moisture for plant use and on soil density. Soil density is important because it affects the movement of water in a soil and the extent of rooting plants. Although percolation data are not given in table 12, the percolation rate was estimated by considering the proportion of coarse fragments larger than 2 millimeters, the proportion of sand, silt, and clay, the bulk density, and the other properties that affect percolation.

Chemical data, such as those on extractable cations, exchangeable acidity, and cation exchange capacity (the ability of a soil to hold and supply plant nutrieents), can be used to estimate the fertility or potential fertility of a soil. These analyses are helpful in determining the amounts of fertilizer and lime required for optimum crop yields.

Characterization data are also used as a basis for classifying soils into various categories of the current classification system.

Bedington shaly silt loam
S64–Pa–22–5 (1–9)

The Bedington series consists of deep, well-drained soils that developed in residuum from gray shale and sandstone.

Shale fragments make up a large proportion of the profile and, even in the surface horizon, modify the effect of all soil properties. The content of coarse fragments larger than 2 millimeters increases with increasing depth to about 65 to 85 percent in the C horizon. The materials less than 2 millimeters in diameter are fairly equally distributed as sand, silt, and clay, though the sand fractions have a slightly higher percentage than the others. The sand increases with increasing depth, but the silt decreases. Sand-sized materials tend to weather to silt-sized, though this process decreases with increasing depth. The increase in clay in the B horizon probably is a result of clay moving from the A horizon into the B horizon, where it is deposited.

Bulk denisty, pore space, and available moisture are fairly uniform throughout the profile. The coarse fragments are the controlling property, and their proportions change little with depth.

The cation exchange capacity averages about 20 milliequivalents per 100 grams of soil. The profile shows generally decreasing pH and extractable calcium with increasing depth. Liming the surface has raised the pH and calcium content to considerable depths because the high content of coarse fragments allows relatively rapid downward movement of the lime materials in suspension or in solution.

A weathering profile, if present at all, is weakly developed in this soil. This is somewhat unexpected for a residual, well-drained soil. The profile has a mineralogical, textural, and chemical discontinuity at a depth of 42 inches. This difference probably is inherited from the parent rock.

Because of the high content of coarse fragments, percolation rates for the Bedington soils are well above 1 inch per hour, which is the Pennsylvania Department of Health minimum for septic tank drainage fields. Sites for septic tanks should be selected carefully because rapid percolation of effluent results in incomplete purification and possible pollution of nearby water sources.

Calvin shaly silt loam
S64–Pa–22–3 (1–4)

The Calvin series consists of moderately deep, well-drained soils that developed in residuum from red shale and sandstone.

These soils are youthful and show little evidence of clay movement or accumulation. Coarse fragments tend to increase both in size and number as depth increases, and they grade to bedrock at a depth of less than 40 inches. This increase of coarse fragments with depth accounts for the increase in bulk density with depth.

Chemical data show that these soils have low to moderate fertility. The content of calcium and the pH are higher in the horizons near the surface than in lower horizons because of past applications of lime. Calvin soils are marginal for farming because they lack sufficient depth to bedrock, have a high proportion of coarse fragments, have moderately low cation exchange capacity, and are inherently high in acidity in their parent materials.

The fairly high content of organic carbon in the horizons near the surface probably accounts for the higher cation exchange capacity of these horizons.

This profile differs from the profile of other soil series sampled in that it contains significant amounts of chlorite. Chlorite is common in soils that formed in material weathered from the Mauch Chunk formation. This soil, however, is not weathered to a great degree. Evidence is not sufficient to determine whether the lack of a well-developed profile indicates the youthfulness of this soil, truncation by erosion, or presence of a mineral resistant to weathering.

The percolation rate for Calvin soils meets the minimum Pennsylvania Health Department standards for septic tank disposal fields, but the soils have severe limitations for this use because bedrock is near the

surface and there is danger of contaminating the ground water.

Chavies fine sandy loam
S64–Pa–22–2 (1–13)

The Chavies series consists of deep, well-drained soils that occur on low terraces. These soils developed in sediments that were derived from limestone, shale, and sandstone.

The upper horizons in Chavies soils have few coarse fragments. These horizons developed in sediments that were deposited by slowly moving water. The lower horizons, however, have a high content of coarse fragments and developed from sediments deposited by rapidly moving water. The stratification of materials less than 2 millimeters in diameter further indicates cumulative deposition on the flood plains of streams. The increase in clay in the B horizon is evidence of clay that accumulated as a result of soil-forming processes.

Because of their high content of sand, the Chavies soils retain little moisture and tend to be droughty. Because they are low in clay content, these soils have low cation exchange capacity. Most horizons have less than 50 percent base saturation, low pH, and high exchangeable hydrogen. These chemical characteristics indicate intense leaching and account for the low inherent fertility of Chavies soils. The higher pH values of the upper horizons indicate that lime recently has been applied.

Although alluvial in origin, this profile is high enough above the Susquehanna River to have developed definite layers. This profile has a dominance of illite in the subsoil and vermiculite and interstratified clay minerals in the A horizon. One distinct feature is the discontinuity in the middle of the profile. The B23t and C1 horizons, at depths between 24 and 33 inches, have high content of vermiculite that differs greatly from the content of vermiculite in the horizons both above and below. This is accompanied by a definite textural and chemical (exchange properties) break in the profile at a depth of 28 inches. The material in the B23t and C1 horizons of this alluvial soil probably was deposited at a different time than the material in other layers, and properties have not been greatly changed by subsequent weathering and clay translocation.

This soil has rapid percolation and is suitable for septic tank disposal fields, but contamination of ground water and wells is a hazard.

Comly silt loam
S64–Pa–22–9 (1–8)

The Comly series consists of deep, moderately well drained soils that developed in residuum from gray, acid shale and sandstone.

The relative proportions of sand, silt, and clay in the profile suggest that the parent bedrock consisted dominantly of silt- and sand-sized particles, and that some of the sand-sized particles were reduced to silt-sized particles as the bedrock weathered. The clay that accumulated in the B horizon indicates the formation of clay-enriched horizons through a normal process of soil development.

The lower horizons have firm, brittle consistence and high bulk density, decreased pore space, and low moisture retention. These properties are characteristic of fragipans.

The exchange capacity and the composition of the cations on the exchange sites indicate that the Comly soils are suitable for fair crop production.

In these soils weathering has fairly well developed the profile above the fragipan. This is somewhat remarkable when contrasted to the profile of the well-drained Bedington soils, which are distinctly less weathered, though formed from parent material similar to that of the Comly soils.

Because percolation is impeded by the fragipan at a depth of about 23 inches, Comly soils have serious limitations if used for septic tank disposal fields.

Hagerstown silt loam
S64-Pa-22-6 (1-9)

The Hagerstown series consists of deep, well-drained soils that formed in residuum from weathered limestone.

Coarse fragments are not numerous in this profile of Hagerstown silt loam. The fragments primarily are chert, which is relatively resistant to weathering. Coarse fragments and materials less than 2 millimeters in diameter are somewhat stratified. This stratification may be a result of the original bedding in the limestone parent material. The high content of clay and the resulting high content of very small pores are reflected in the low bulk density and the high moisture retention in these soils. Much of the water is held in an unavailable form, and available moisture is not proportionately high. Because of the high clay content, tillage when moisture content is high may destroy structure and cause poor tilth. In many places tillage is difficult on sloping Hagerstown soils because erosion tends to expose the B horizon, which is much higher in clay content than the original surface layer.

The cation exchange capacity of this soil is high, relative to most soils in the area, and it increases as depth increases. Cation exchange capacity is not so high as the clay content normally suggests, because kaolinite and illite are the dominant clay minerals. Hagerstown soils are moderately fertile because of the high base status, the pH, and high ratios of calcium to magnesium and carbon to nitrogen. Although not reported in table 13, Hagerstown soils have a high content of iron oxide that is a result of the iron that concentrated during the weathering of limestone. This iron gives the soil its characteristic bright, reddish-brown color.

This profile of Hagerstown silt loam, like the one of Bedington shaly silt loam, has less illite and more kaolin than the other modal profiles sampled in Dauphin County. This suggests a greater degree of weathering, a difference inherited from the parent material, or both. The distribution of clay types according to depth (illite, vermiculite, and the interstratified component) indicates a relatively weakly developed profile of weathering. This is somewhat surprising when it is considered that Hagerstown soils are residual

(on limestone) and occur on relatively old geomorphic landscapes.

Summary

Bedington, Comly, Calvin, and Hagerstown soils are common in the Ridge and Valley physiographic region of Pennsylvania. Bedington and Comly soils are deep and developed from weathered gray shale, whereas the Calvin soils are moderately deep and developed from the weathered purplish-red shale. None of these soils is highly productive, though the Bedington soils have moderate fertility. The shale parent material has dominated in the soil formation of all these soils. Although Hagerstown soils are highly productive, eroded areas are difficult to till because the exposed B horizon has a high clay content. Chavies soils are not extensive in this county, and they occur only along major streams. The dominant characteristic of the Chavies soils is the coarse texture throughout the profile.

Except for the profile of Hagerstown silt loam (S64-Pa-22-6 (1-9) and the profile of Bedington shaly silt loam (S64-Pa-22-5 (1-9), the feature common to the soils sampled is the dominance of illite in the profiles. This dominance indicates that the soils were derived from weathered sedimentary rocks in which the illite commonly is a principal clay mineral. In some respects the content of clay minerals is unique for a particular soil series or a specific profile sampled. These characteristics have been discussed along with interpretations related to soil genesis that are discernible from the clay mineral distribution within the profiles.

Climate[6]

Although Dauphin County lies wholly within the valley of the Susquehanna River, the climate varies widely, primarily because the landscape is so varied from north to south. Blue Mountain moderates the weather systems as they approach from the northwest, so that the southern valley area has milder, drier climate than the northern ridge and valley area, where cloudiness and precipitation are greater. Weather is variable from day to day and seasonally from year to year because every few days the prevailing westerly winds normally bring both high and low pressure systems throughout the county. Data on temperature and precipitation are given in table 13.

Temperature

In the area south of Blue Mountain, the average annual temperture is 53° F., but normally throughout the years, it is 3° to 4° lower in northern areas. Temperatures generally are between 0° and 100° throughout the county, but occasionally temperatures dip below zero for several consecutive nights in winter, when the maximum temperature in the afternoon is in the teens. The lowest temperature ever recorded was —15° and the highest was 107°. Heat waves develop only occasionally, and they last for several days to a week or more. High humidity almost always accompanies high temperatures, and together they are discomforting, though nights generally are cool and comfortable.

The growing season is the interval between the last 32° temperature in spring and the first in fall. It normally extends from mid-April through most of October, or about 194 days. From Blue Mountain northward, the growing season is about 30 days shorter. From year to year the growing season ranges from 142 days to 239 days in the southern part of the county and from 119 to 197 days in the northern part. Table 14 shows the probabilities of the last freezing temperatures of or lower than 16°, 20°, 24°, 28°, and 32° in spring and the first in fall at Harrisburg. These probabilities are fairly representative of Blue Mountain. North of the mountain ridge, the dates of given probabilities are about 10 days later in spring and about 20 days earlier in fall.

Precipitation

Annual precipitation normally totals from 38 to 40 inches in the southern part of the county and from 42 to 46 inches in the northern part. From year to year, however, variations may be sizable; totals have ranged from 26 to 51 inches through the 30-year period of record. Precipitation generally is well distributed throughout the year, though monthly extremes range from 0.02 inch to 10.67 inches. Dry spells occur at any time, but extended periods of drought are rare.

About 60 percent of the annual total precipitation occurs during the growing season (April through October) and is mostly in the form of showers and thunderstorms. The average number of thunderstorms is 33 per year. The rainfall in thunderstorms is occasionally heavy, and runoff is rapid. The maximum amounts of rain recorded in the county are 1.05 inches in 5 minutes, 1.30 inches in 10 minutes, 1.5 inches in 15 minutes, 2.20 inches in 30 minutes, and 2.42 inches in 1 hour. Rainfall of as much as 1 inch in 30 minutes can be expected about once every 2 years. Precipitation during fall, winter, and spring is more widespread, is less intense, and lasts longer than that in summer. In these seasons precipitation lasts 6 to 24 hours or more. A daily amount of as much as 2.4 inches can be expected once a year and of 3.9 inches once every 5 years.

Snowfall accounts for much of the precipitation from late in November through March. Seasonal totals average from 30 inches in the southern part of the county to nearly 40 inches in the northern mountain area. From year to year the amounts vary widely; less than 10 inches are recorded in some winters and more than 80 inches in other winters. Daily snowfall normally totals less than 6 inches, though in coastal storms there has been a total of 21 inches or more. The ground is covered with snow for about 18 days per winter in the southern part of the county and from 25 to 30 days in the northern part.

[6] By NELSON M. KAUFFMAN, State climatologist, U. S. Weather Bureau, Harrisburg, Pa.

TABLE 13.—*Temperature and precipitation*

[All data from records at Harrisburg; elevation 365 feet]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average extreme maximum	Average extreme minimum	Average total	One year in 10 will have—		Snow	
						Less than—	More than—	Average total	Average number of days with depth of—
	°F	°F	°F	°F	In.	In.	In.	In.	1 inch or more
January	39	24	58	9	2.8	1.2	4.6	7.8	3
February	41	24	60	10	2.3	1.3	3.5	7.2	2
March	50	31	71	18	3.4	1.5	5.7	6.5	2
April	63	41	83	30	3.0	1.4	4.7	.2	(1)
May	74	51	89	39	3.9	1.0	7.4	(2)	0
June	83	60	94	49	3.4	1.1	5.5	0	0
July	87	65	96	56	3.5	1.2	5.5	0	0
August	85	64	95	53	3.7	1.2	6.2	0	0
September	78	56	91	42	2.8	.9	5.3	0	0
October	67	45	83	32	3.0	1.1	6.8	(2)	(1)
November	52	35	71	21	3.0	.7	5.2	1.8	(1)
December	41	25	60	10	2.9	1.1	5.0	5.9	2
Annual	63	43	[3]98	[4]4	37.7	30.8	47.2	29.5	9

[1] Less than 0.5 day.
[2] Trace.
[3] Highest maximum during 1931–60.
[4] Lowest minimum during 1931–60.

TABLE 14.—*Probabilities of last freezing temperature in spring and first in fall*

[All data from records at Harrisburg; elevation 365 feet]

Probability	Dates of given probability for temperatures of—				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	Mar. 15	Mar. 21	Apr. 3	Apr. 15	Apr. 27
2 years in 10 lather than	Mar. 8	Mar. 16	Mar. 28	Apr. 9	Apr. 22
5 years in 10 lather than	Feb. 23	Mar. 6	Mar. 17	Mar. 29	Apr. 13
Fall:					
1 year in 10 earlier than	Nov. 26	Nov. 20	Nov. 11	Oct. 31	Oct. 8
2 years in 10 earlier than	Dec. 1	Nov. 25	Nov. 15	Nov. 4	Oct. 14
5 years in 10 earlier than	Dec. 12	Dec. 4	Nov. 23	Nov. 12	Oct. 24

Literature Cited

(1) AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS.
1961. STANDARD SPECIFICATIONS FOR HIGHWAY MATERIALS AND METHODS OF SAMPLING AND TESTING. Ed. 8, 2 v., illus. Washington, D.C.

(2) ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS.
1955. OFFICIAL METHODS OF ANALYSIS. Ed. 8, pp. 805–806, illus. Washington, D.C.

(3) BALDWIN, M., KELLOGG, C. E., and THORP, J.
1938. SOIL CLASSIFICATION. U.S. Dept. Agr. Yearbook: 97–1001, illus.

(4) JEFFRIES, C. D.
1946. A RAPID METHOD FOR THE REMOVAL OF FREE IRON OXIDES IN SOIL PRIOR TO PETROGRAPHIC ANALYSIS. Soil Sci. Soc. Amer. Proc., 3:162–166, illus.

(5) KILMER, V. J.
1960. THE ESTIMATION OF FREE IRON OXIDES IN SOILS. Soil Sci. Soc. Amer. Proc. 24: 420–421.

(6) ———— and ALEXANDER, L. T.
1949. METHODS OF MAKING MECHANICAL ANALYSIS OF SOILS. Soil Sci. 68: 15–24.

(7) ———— and MULLINS, J. F.
1954. IMPROVED STIRRING AND PIPETTING APPARATUS FOR MECHANICAL ANALYSIS OF SOILS. Soil Sci. 77: 437–441, illus.

(8) MEHLICH, A.
1938. USE OF TRIETHANOLAMINE ACETATE-BARIUM HYDROXIDE BUFFER FOR THE DETERMINATION OF SOME BASE EXCHANGE PROPERTIES AND LIME REQUIREMENT OF SOIL. Soil Sci. Soc. Amer. Proc., 3:162–166, illus.

(9) PEECH, MICHAEL, ALEXANDER, L. T., DEAN, L. A., and REED, J. F.
1947. METHODS OF SOIL ANALYSIS FOR SOIL-FERTILITY INVESTIGATIONS. U.S. Dept. Agri., Cir. 757, 25 pp., illus.
(10) RICHARDS, L. A.
1947. PRESSURE-MEMBRANE APPARATUS—CONSTRUCTION AND USE. Agr. Eng. 28: 451–454, 460, illus.
(11) ———
1949. METHOD FOR MOUNTING POROUS PLATES USED IN SOIL MOISTURE MEASUREMENTS. Agron. J. 41: 489–490, illus.
(12) SCHNUR, C. LUTHER.
1937. YIELD, STAND, AND VOLUME TABLES FOR EVEN-AGED UPLAND OAK FORESTS. U.S. Dept. Agri. Tech. Bul. No. 560, 88 pp., illus. [Reprinted 1961]
(13) SIMONSON, ROY W.
1962. SOIL CLASSIFICATION IN THE UNITED STATES. Sci. 137: 1027–1034.
(14) SOCIETY OF AMERICAN FORESTERS.
1954. FOREST COVER TYPES OF NORTH AMERICA. Report of the Committee on Forest Types. 67 pp., illus.
(15) THORP, JAMES and SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126.
(16) UHLAND, R. E. and O'NEAL, A. M.
1951. SOIL PERMEABILITY DETERMINATION FOR USE IN SOIL AND WATER CONSERVATION. Soil Conservation Service Tech. Paper 101, 36 pp., illus.
(17) UNITED STATES DEPARTMENT OF AGRICULTURE.
1951. SOIL SURVEY MANUAL. U.S. Dept. Agr. Handbook 18, 503 pp., illus. [Supplement issued May 1962]
(18) ———
1954. BASIC FOREST SURVEY DATA FOR DAUPHIN COUNTY, PENNSYLVANIA. U. S. Forest Service, Northeastern Forestry Exp. Sta.
(19) ———
1954. DIAGNOSIS AND IMPROVEMENT OF SALINE AND ALKALI SOILS. U.S.D.A. Agr. Handbook No. 60., 160 pp., illus.
(20) ———
1960. SOIL CLASSIFICATION, A COMPREHENSIVE SYSTEM, 7TH APPROXIMATION. 265 pp., illus. [Supplement issued March 1967]
(21) WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS.
1953. THE UNIFIED SOIL CLASSIFICATION SYSTEM. Tech. Memo. 3–357, 2 v. and appendix, illus.

Glossary

Aeration, soil. The processes by which air and other gases in the soil are exchanged with air of the atmosphere. The rate of soil aeration depends largely on the size and number of the pores in the soil and on the amount of water in the pores. A soil that has many large pores is said to be well aerated.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Calcareous soil. A soil containing enough calcium carbonate (in many places with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse-textured soils. Sand and loamy sand.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Conglomerate. Rock composed of gravel and rounded stones cemented together by hardened clay, lime, iron oxide, or silica.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Depth, soil. The distance from the soil surface to bedrock. Classes of soil depth are as follows:

Deep.—36 inches + to bedrock.

Moderately deep.—20 to 36 inches to bedrock.

Shallow.—10 to 20 inches to bedrock.

Very shallow.—Less than 10 inches to bedrock.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage, soil. (1) The removal of excess surface or ground water from a soil by means of surface or subsurface drains. (2) The effect of soil characteristics that regulate the ease or rate of natural drainage. A soil is said to be well drained when the excess water drains away readily, but not rapidly, and poorly drained when the excess water is removed so slowly that the soil remains wet a large part of the time.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fine-textured soils. *Moderately fine textured:* Clay loam, sandy clay loam, silty clay loam; *Fine-textured:* Sandy clay, silty clay, and clay. Roughly, soil that contains 35 percent or more of clay.

Fragipan. A loamy brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living

organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Leached soil. A soil from which most of the soluble materials have been removed from the entire profile or have been removed from one part of the profile and have accumulated in another part.

Litter, forest. The upper, only slightly decomposed, part of the forest floor.

Loam. Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Mechanical analysis (soils). The percentage of the various sizes of individual mineral particles, or separates, in the soil. Also, a laboratory method of determining soil texture.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural soil drainage. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Percolation. The downward movement of water through the soil.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows:

Rapid.—More than 6.3 inches per hour.
Moderately rapid.—2.0 to 6.3 inches per hour.
Moderate.—0.63 inch to 2.0 inches per hour.
Moderately slow.—0.20 to 0.63 inch per hour.
Slow.—Less than 0.2 inch per hour.

Porosity, soil. The degree to which the soil mass is permeated with pores or cavities.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour", soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.9 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Residual material. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil has formed.

Runoff (hydraulics). The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sedimentary rock. A rock composed of particles deposited from suspension in water. The chief sedimentary rocks are conglomerate, from gravel; sandstone, from sand; shale, from clay; and limestone, from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sands have been consolidated into sandstone.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetation barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete integration and decomposition of the rock.

U. S. GOVERNMENT PRINTING OFFICE : 1971 O - 383-854

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which the mapping unit belongs. Some interpretations for crops and pasture are in the introduction to the subsection "Management by capability units." Other information is given in tables as follows:

Estimated productivity ratings of the soils, table 1, p. 12.
Table of managing woodland, table 2, p. 16.
Suitability of soils for wildlife, table 3, p. 23.
Engineering uses of soils, tables, 4, 5, and 6, pp. 26 through 39.
Use of soils for nonfarm uses, table 7, p. 42.
Approximate acreage and proportionate extent of soils, table 9, p. 60.

Map symbol	Mapping unit	Described on page	Capability unit Symbol	Capability unit Page
AbA	Albrights silt loam, 0 to 3 percent slopes	59	IIw-2	9
AbB2	Albrights silt loam, 3 to 10 percent slopes, moderately eroded	59	IIe-5	9
AnB	Andover gravelly loam, 3 to 8 percent slopes	61	IVw-1	11
AoB	Andover very stony loam, 0 to 8 percent slopes	61	VIIs-2	14
AsB2	Athol silt loam, 3 to 8 percent slopes, moderately eroded	62	IIe-1	8
At	Atkins silt loam	63	IIIw-1	10
Bb	Barbour silt loam	63	IIw-1	9
Bc	Basher silt loam	64	IIw-1	9
BeA	Bedington shaly silt loam, 0 to 3 percent slopes	64	I-1	8
BeB2	Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded	64	IIe-1	8
BeC2	Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded	64	IIIe-1	9
BhB2	Berks channery silt loam, 3 to 8 percent slopes, moderately eroded	65	IIe-4	9
BhC2	Berks channery silt loam, 8 to 15 percent slopes, moderately eroded	65	IIIe-3	10
BkB2	Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded	65	IIe-4	9
BkC2	Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded	65	IIIe-3	10
BkD2	Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded	66	IVe-1	10
BrB2	Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded	66	IIe-4	9
BrC2	Brecknock channery silt loam, 8 to 20 percent slopes, moderately eroded	66	IIIe-3	10
BtA	Brinkerton and Armagh silt loams, 0 to 3 percent slopes	67	IVw-1	11
BtB2	Brinkerton and Armagh silt loams, 3 to 8 percent slopes, moderately eroded	67	IVw-1	11
BuB	Buchanan gravelly loam, 3 to 8 percent slopes	68	IIe-5	9
BwB	Buchanan very stony loam, 0 to 8 percent slopes	68	VIs-1	11
CaB	Calvin very stony silt loam, 0 to 8 percent slopes	68	VIs-1	11
CaD	Calvin very stony silt loam, 8 to 25 percent slopes	68	VIIs-1	11
CaF	Calvin very stony silt loam, 25 to 75 percent slopes	69	VIIs-1	11
CkC2	Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded	69	IVe-1	10
CkD2	Calvin-Klinesville shaly silt loams, 15 to 25 percent slopes, moderately eroded	70	VIe-1	11
ClA	Calvin-Leck Kill shaly silt loams, 0 to 3 percent slopes	70	IIe-4	9
ClB2	Calvin-Leck Kill shaly silt loams, 3 to 8 percent slopes, moderately eroded	70	IIe-4	9
ClC2	Calvin-Leck Kill shaly silt loams, 8 to 15 percent slopes, moderately eroded	70	IIIe-3	10
CmB2	Captina silt loam, 3 to 8 percent slopes, moderately eroded	71	IIe-5	9
CnA	Chavies fine sandy loam, 0 to 3 percent slopes	72	IIs-1	9
CnB2	Chavies fine sandy loam, 3 to 8 percent slopes, moderately eroded	72	IIe-2	9
CnC2	Chavies fine sandy loam, 8 to 15 percent slopes, moderately eroded	72	IIIe-4	10
CoB2	Comly silt loam, 2 to 8 percent slopes, moderately eroded	73	IIe-5	9
Cr	Croton silt loam	73	IVw-1	11
DcB2	Dekalb channery sandy loam, 3 to 8 percent slopes, moderately eroded	74	IIe-4	9
DcC2	Dekalb channery sandy loam, 8 to 15 percent slopes, moderately eroded	74	IIIe-5	10
DlB	Dekalb and Lehew very stony sandy loams, 0 to 8 percent slopes	74	VIs-1	11
DlD	Dekalb and Lehew very stony sandy loams, 8 to 25 percent slopes	74	VIs-1	11
DlF	Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes	74	VIIs-1	11
DuB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded	75	IIe-1	8
DvA	Duncannon very fine sandy loam, 0 to 3 percent slopes	75	I-1	8
DvB2	Duncannon very fine sandy loam, 3 to 8 percent slopes, moderately eroded	76	IIe-2	9
HaA	Hagerstown silt loam, 0 to 3 percent slopes	76	I-1	8
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	76	IIe-1	8
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	77	IIIe-1	9
Hu	Huntington silt loam, local alluvium	77	I-1	8
KaB2	Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded	78	IIIe-6	10
KaC2	Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded	78	IVe-2	11
KaD2	Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded	78	VIe-1	11
KaE2	Klinesville shaly silt loam, 25 to 50 percent slopes, moderately eroded	78	VIIe-1	11
LaB2	Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded	79	IIe-3	9
LaC2	Laidig gravelly loam, 8 to 20 percent slopes, moderately eroded	79	IIIe-2	10
LdB	Laidig very stony loam, 0 to 8 percent slopes	79	VIs-1	11
LdD	Laidig very stony loam, 8 to 25 percent slopes	79	VIs-1	11
LeB2	Lawrenceville very fine sandy loam, 2 to 8 percent slopes, moderately eroded	79	IIe-5	9
LhB2	Lehigh silt loam, 3 to 8 percent slopes, moderately eroded	81	IIIw-2	10
LrB2	Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded	82	IIs-2	9
LrC2	Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded	82	IIIe-4	10
LrD2	Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	82	IVe-3	11
LsD	Lewisberry very stony sandy loam, 5 to 25 percent slopes	82	VIs-1	11
LsF	Lewisberry very stony sandy loam, 25 to 60 percent slopes	82	VIIs-1	11
Lt	Lindside silt loam	83	IIw-1	9
Lw	Lindside silt loam, coal overwash	83	IIw-1	9
Ma	Made land, sanitary fill	83	------	--
Md	Mine dumps	83	------	--
Mu	Muck	83	VIIw-1	11
NeC2	Neshaminy gravelly silt loam, 3 to 12 percent slopes, moderately eroded	84	IIe-1	8
NsB	Neshaminy very stony silt loam, 0 to 8 percent slopes	84	VIs-1	11
NsD	Neshaminy very stony silt loam, 8 to 25 percent slopes	84	VIs-1	11
PeB2	Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded	85	IIe-4	9
PeC2	Penn shaly silt loam, 8 to 15 percent slopes, moderately eroded	85	IIIe-3	10
Ph	Philo silt loam	85	IIw-1	9
RdB2	Readington silt loam, 3 to 8 percent slopes, moderately eroded	86	IIe-5	9
Rv	Riverwash	86	VIIw-2	11
St	Strip mine spoil	86	------	--
Ta	Tioga fine sandy loam	88	IIs-1	9
Tg	Tioga fine sandy loam, high bottom	88	IIs-1	9
Ua	Urban land, alluvial materials	88	------	--
Ub	Urban land, limestone materials	88	------	--
Us	Urban land, shale materials	88	------	--
VsC	Very stony land, sloping	88	VIIIs-1	14
VsF	Very stony land, steep	88	VIIIs-1	14
Wa	Watchung silt loam	89	Vw-1	11
Wc	Watchung very stony silt loam	89	VIIs-2	14
WeC2	Weikert shaly silt loam, 5 to 15 percent slopes, moderately eroded	89	IVe-2	11
WeD2	Weikert shaly silt loam, 15 to 25 percent slopes, moderately eroded	89	VIe-1	11
WeE2	Weikert shaly silt loam, 25 to 40 percent slopes, moderately eroded	89	VIIe-1	11

383-854 O - 72 (Face maps)

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

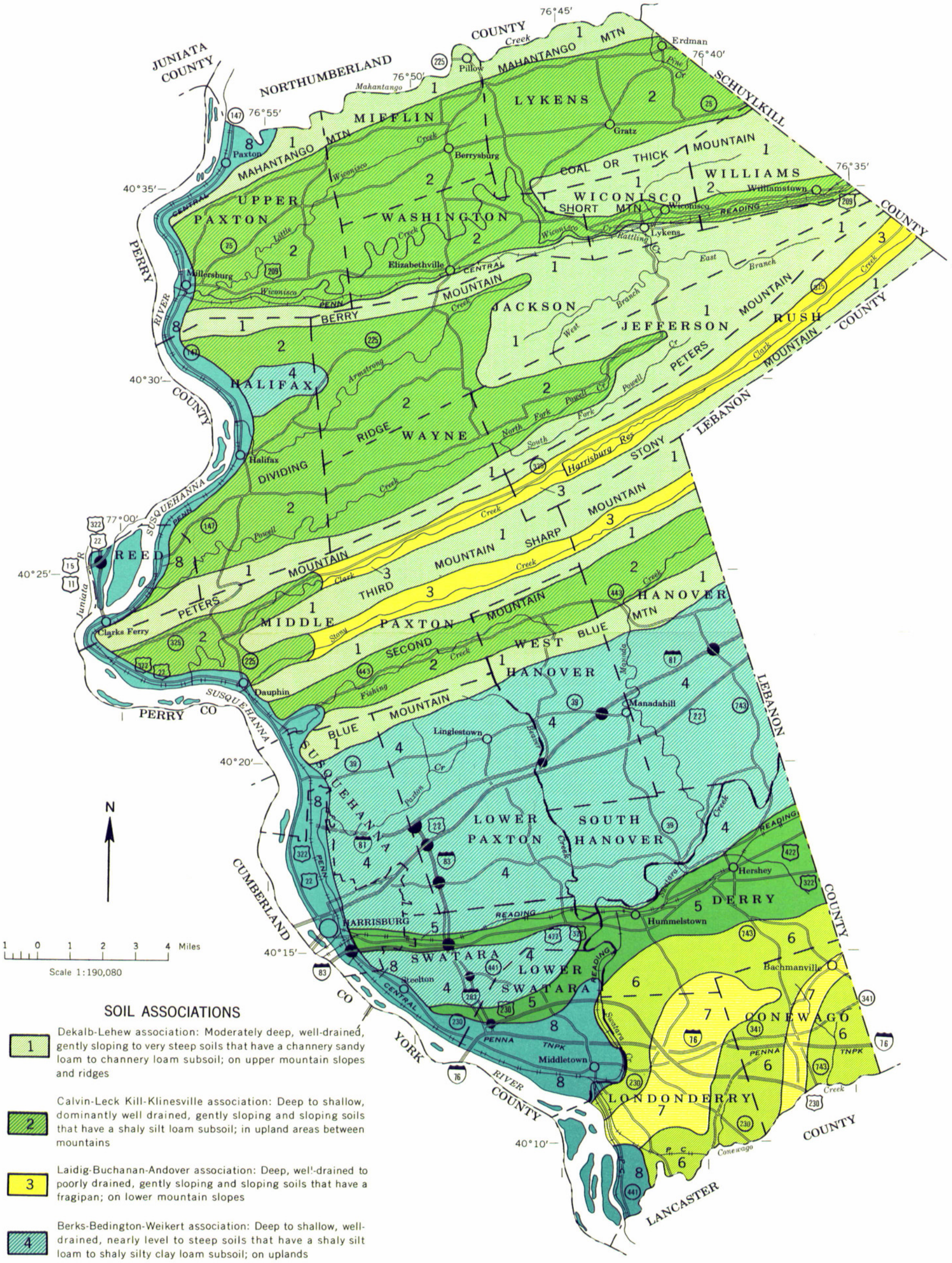
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PENNSYLVANIA STATE UNIVERSITY, AGRICULTURAL EXPERIMENT STATION AND AGRICULTURAL EXTENSION SERVICE, AND THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE, STATE SOIL AND WATER CONSERVATION COMMISSION

DAUPHIN COUNTY, PENNSYLVANIA

GENERAL SOIL MAP



SOIL ASSOCIATIONS

1 Dekalb-Lehew association: Moderately deep, well-drained, gently sloping to very steep soils that have a channery sandy loam to channery loam subsoil; on upper mountain slopes and ridges

2 Calvin-Leck Kill-Klinesville association: Deep to shallow, dominantly well drained, gently sloping and sloping soils that have a shaly silt loam subsoil; in upland areas between mountains

3 Laidig-Buchanan-Andover association: Deep, well-drained to poorly drained, gently sloping and sloping soils that have a fragipan; on lower mountain slopes

4 Berks-Bedington-Weikert association: Deep to shallow, well-drained, nearly level to steep soils that have a shaly silt loam to shaly silty clay loam subsoil; on uplands

5 Hagerstown-Duffield association: Deep, well-drained, nearly level to gently sloping soils that have a silty clay loam to clay subsoil; on uplands

6 Lewisberry-Penn-Athol association: Deep and moderately deep, well-drained, gently sloping and sloping soils that have a dominantly gravelly sandy clay loam to shaly silty clay loam subsoil; on uplands

7 Brecknock-Neshaminy association: Deep, well-drained, gently sloping and sloping soils that have a clay loam and silty clay loam subsoil; on uplands

8 Duncannon-Chavies-Tioga association: Deep, well-drained, nearly level and gently sloping soils that have a fine sandy loam to silt loam subsoil; on terraces and flood plains mostly along the Susquehanna River

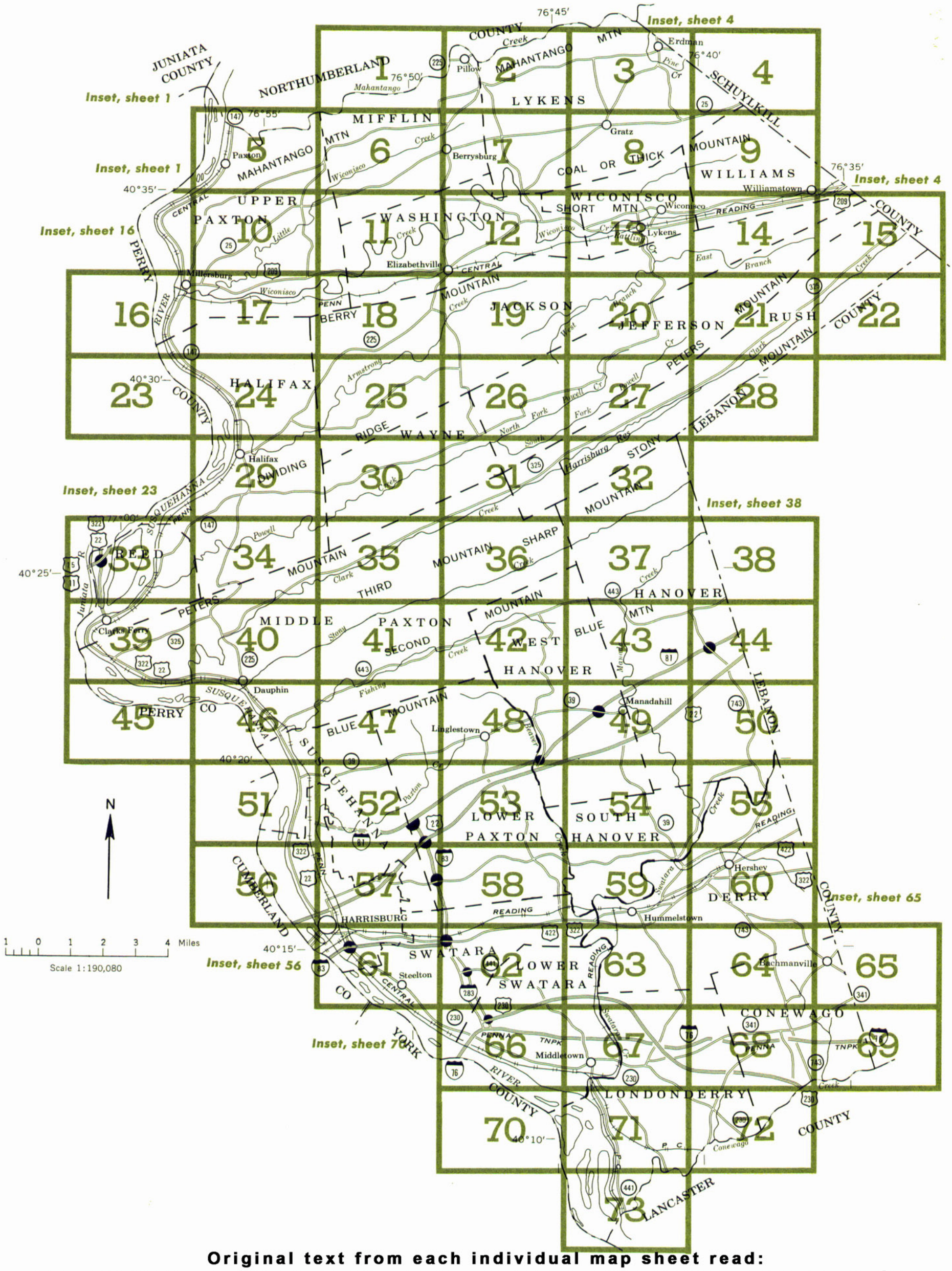
NOTE—

This map is intended for general planning. Each delineation may contain soils having ratings different from those shown on the map. Use detailed soil maps for operational planning.

November 1970

DAUPHIN COUNTY, PENNSYLVANIA

INDEX TO MAP SHEETS



Original text from each individual map sheet read:

This map is one of a set compiled in 1970 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, the Pennsylvania State University, Agricultural Experiment Station and Agricultural Extension Service, and the Pennsylvania Department of Agriculture, State Soil and Water Commission. Photobase from 1963 aerial photographs. Grid values based on Pennsylvania plane coordinate system, south zone. 1927 North American datum.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DAUPHIN COUNTY, PENNSYLVANIA

PENNSYLVANIA STATE UNIVERSITY
COLLEGE OF AGRICULTURE AND AGRICULTURAL EXPERIMENT STATION
PENNSYLVANIA DEPARTMENT OF AGRICULTURE

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level soils or land types, but some are for land types that have a considerable range in slope. The number, 2, shows thar the soil is moderately eroded.

SYMBOL	NAME
AbA	Albrights silt loam, 0 to 3 percent slopes
AbB2	Albrights silt loam, 3 to 10 percent slopes, moderately eroded
AnB	Andover gravelly loam, 3 to 8 percent slopes
AoB	Andover very stony loam, 0 to 8 percent slopes
AsB2	Athol silt loam, 3 to 8 percent slopes, moderately eroded
At	Atkins silt loam
Bb	Barbour silt loam
Bc	Basher silt loam
BeA	Bedington shaly silt loam, 0 to 3 percent slopes
BeB2	Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded
BeC2	Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded
BhB2	Berks channery silt loam, 3 to 8 percent slopes, moderately eroded
BhC2	Berks channery silt loam, 8 to 15 percent slopes, moderately eroded
BkB2	Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded
BkC2	Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded
BkD2	Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded
BrB2	Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded
BrC2	Brecknock channery silt loam, 8 to 20 percent slopes, moderately eroded
BrA	Brinkerton and Armagh silt loams, 0 to 3 percent slopes
BrB2	Brinkerton and Armagh silt loams, 3 to 8 percent slopes, moderately eroded
BuB	Buchanan gravelly loam, 3 to 8 percent slopes
BvB	Buchanan very stony loam, 0 to 8 percent slopes
CaB	Calvin very stony silt loam, 0 to 8 percent slopes
CaD	Calvin very stony silt loam, 8 to 25 percent slopes
CaF	Calvin very stony silt loam, 25 to 75 percent slopes
CkC2	Calvin-Klinesville shaly silt loams, 8 to 15 percent slopes, moderately eroded
CkD2	Calvin-Klinesville shaly silt loams, 15 to 25 percent slopes, moderately eroded
ClA	Calvin-Leck Kill shaly silt loams, 0 to 3 percent slopes
ClB2	Calvin-Leck Kill shaly silt loams, 3 to 8 percent slopes, moderately eroded
ClC2	Calvin-Leck Kill shaly silt loams, 8 to 15 percent slopes, moderately eroded
CmB2	Captina silt loam, 3 to 8 percent slopes, moderately eroded
CnA	Chavies fine sandy loam, 0 to 3 percent slopes
CnB2	Chavies fine sandy loam, 3 to 8 percent slopes, moderately eroded
CnC2	Chavies fine sandy loam, 8 to 15 percent slopes, moderately eroded
CoB2	Comly silt loam, 2 to 8 percent slopes, moderately eroded
Cr	Croton silt loam
DcB2	Dekalb channery sandy loam, 3 to 8 percent slopes, moderately eroded
DcC2	Dekalb channery sandy loam, 8 to 15 percent slopes, moderately eroded
DlB	Dekalb and Lehew very stony sandy loams, 0 to 8 percent slopes
DlD	Dekalb and Lehew very stony sandy loams, 8 to 25 percent slopes
DlF	Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes
DuB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded
DvA	Duncannon very fine sandy loam, 0 to 3 percent slopes
DvB2	Duncannon very fine sandy loam, 3 to 8 percent slopes, moderately eroded
HaA	Hagerstown silt loam, 0 to 3 percent slopes
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded
Hu	Huntington silt loam, local alluvium
KaB2	Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded
KaC2	Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded
KaD2	Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded
KaE2	Klinesville shaly silt loam, 25 to 50 percent slopes, moderately eroded
LaB2	Laidig gravelly loam, 3 to 8 percent slopes, moderately eroded
LaC2	Laidig gravelly loam, 8 to 20 percent slopes, moderately eroded
LdB	Laidig very stony loam, 0 to 8 percent slopes
LdD	Laidig very stony loam, 8 to 25 percent slopes
LeB2	Lawrenceville very fine sandy loam, 2 to 8 percent slopes, moderately eroded
LhB2	Lehigh silt loam, 3 to 8 percent slopes, moderately eroded
LrB2	Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded
LrC2	Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded
LrD2	Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded
LsD	Lewisberry very stony sandy loam, 5 to 25 percent slopes
LsF	Lewisberry very stony sandy loam, 25 to 60 percent slopes
Lt	Lindside silt loam
Lw	Lindside silt loam, coal overwash
Ma	Made land, sanitary fill
Md	Mine dumps
Mu	Muck
NeC2	Neshaminy gravelly silt loam, 3 to 12 percent slopes, moderately eroded
NsB	Neshaminy very stony silt loam, 0 to 8 percent slopes
NsD	Neshaminy very stony silt loam, 8 to 25 percent slopes
PeB2	Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded
PeC2	Penn shaly silt loam, 8 to 15 percent slopes, moderately eroded
Ph	Philo silt loam
RdB2	Readington silt loam, 3 to 8 percent slopes, moderately eroded
Rv	Riverwash
St	Strip mine spoil
Ta	Tioga fine sandy loam
Tg	Tioga fine sandy loam, high bottom
Ua	Urban land, alluvial materials
Ub	Urban land, limestone materials
Us	Urban land, shale materials
VsC	Very stony land, sloping
VsF	Very stony land, steep
Wa	Watchung silt loam
Wc	Watchung very stony silt loam
WeC2	Weikert shaly silt loam, 5 to 15 percent slopes, moderately eroded
WeD2	Weikert shaly silt loam, 15 to 25 percent slopes, moderately eroded
WeE2	Weikert shaly silt loam, 25 to 40 percent slopes, moderately eroded

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Tunnel

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Mine tunnel opening

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
- Unclassified

Canals and ditches (CANAL)

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peak

Depressions

	Large	Small
Crossable with tillage implements		
Not crossable with tillage implements		
Contains water most of the time		

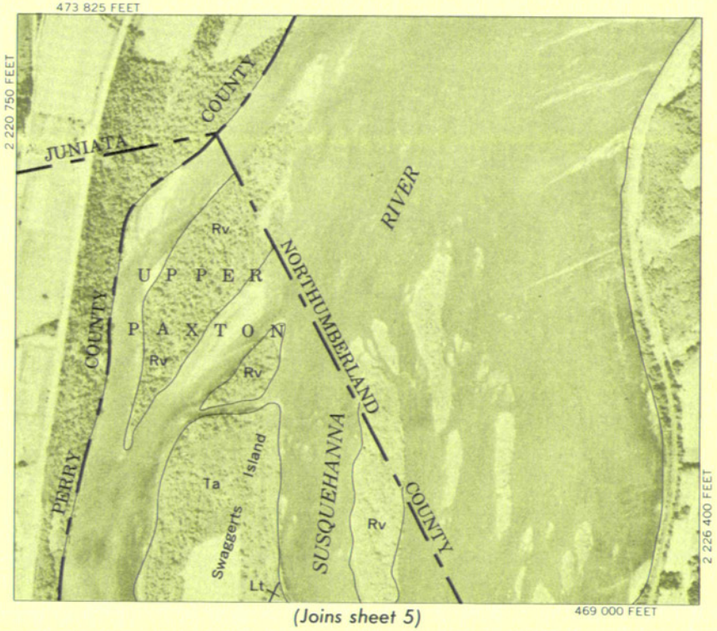
SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully
- **Gravel** pit (G.P.)

482 000 FEET

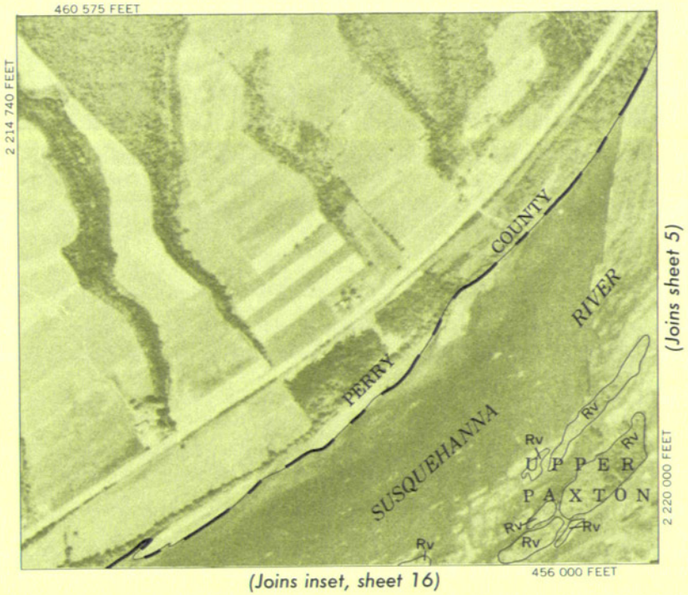
2 240 000 FEET

INSET A



(Joins sheet 5)

INSET B



(Joins sheet 5)

(Joins inset, sheet 16)

(Joins sheet 2)

(Joins sheet 6)

2 260 000 FEET

469 000 FEET

1

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

(2)

N

482 000 FEET

2 260 000 FEET

(Joins inset A, sheet 4)

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 1)

(Joins sheet 3)

(Joins sheet 7)

469 000 FEET

2 280 000 FEET

MAHANTANGO MOUNTAIN

MIFFLIN

LYKENS

NORTHUMBERLAND COUNTY

MAHANTANGO CREEK

Deep Creek

Salem Church

Uniontown School

Pillow

Shepleys School

Ph

225

BtB2 BuA Bc Bb CaF DcD2 DIF LaB2 LaC2 LdB LdD AbB2 At CIA CkC2 CkD2 CIB2 CIC2 KaD2 KaE2

DAUPHIN COUNTY, PENNSYLVANIA — SHEET NUMBER 3

3

N

(Joins inset A, sheet 4)

482 000 FEET

2 280 000 FEET

MAHANTANGO MOUNTAIN

LYKENS

SCHUYLKILL COUNTY

PINE CREEK

Deep Creek

Erdman

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 8)

2 230 000 FEET

469 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0 1/4 1 000 1/2 2 000 3/4 3 000 1 4 000 5 000

482 000 FEET

2 300 000 FEET

INSET A

485 700 FEET

2 276 000 FEET

COUNTY

SCHUYLKILL

CREEK

MAHANTANGO

NORTHUMBERLAND

MOUNTAIN

L Y K E N S

Bb Bc BvB BuB LaC2 AbB2 CaD CkD2 CkC2 CoB2 CIB2 CIC2 KaD2 KaE2 DIF LdD

2 293 140 FEET

482 000 FEET

(Joins sheet 2) | (Joins sheet 3)

KaE2 CIC2 CIB2 CIA KaD2 At Bc CkD2 BtB2 CkC2 Ph AbA KaC2 AbB2 KaB2 CoB2 BtA DcB2 CaB DID LdD

SCHUYLKILL COUNTY

Colemans Church

L Y K E N S

W I L L I A M S

25

(Joins sheet 9)

(Joins sheet 3)

INSET B

462 000 FEET

2 320 000 FEET

PENN CENTRAL

SCHUYLKILL COUNTY

READING

Wiconisco Creek

W I L L I A M S

J A C K S O N

DIF LdD LdB LaC2 LaB2 CIB2 CIC2 At Bc Rv BvB 209

2 327 200 FEET

456 000 FEET

(Joins sheet 9)

(Joins sheet 15)

469 000 FEET

2 320 000 FEET

469 000 FEET

(Joins inset A, sheet 1)

2 220 000 FEET

DAUPHIN COUNTY, PENNSYLVANIA NO. 5

(Joins inset B, sheet 1)

5

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 6)

2 240 000 FEET

(Joins sheet 10)

456 000 FEET

SUSQUEHANNA RIVER

PERRY COUNTY

NORTHUMBERLAND COUNTY

MAHANTANGO CREEK

MAHANTANGO MOUNTAIN

UPPER PAXTON

Swaggerts Island

Graffs Island

PENN CENTRAL

Paxton Union Chapel

Paxton

Negley School

147

Ta Tg Lt Lw Rv Bb Bc DvA DvB2 CnB2 ClB2 ClC2 CkD2 KaE2 KaD2 AbB2 LaC2 LaB2 LdD DlF CaD CaF BuB BtA BtB2 CIA At Te AbA

N

1 Mile

5 000 Feet

469 000 FEET

(Joins sheet 1)

2 240 000 FEET

NORTHUMBERLAND CO.

MAHANTANGO CREEK

MAHANTANGO MOUNTAIN

LYKENS VALLEY

UPPER PAXTON

MIFFLIN

Little Wiconisco Creek

Berrysburg

Curtin

Riegles Church

St Johns Church

WASHINGTON

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 11)

456 000 FEET

2 260 000 FEET

Scale 1:15 840

0 1/4 1/2 3/4 1

1 000 2 000 3 000 4 000 5 000

DAUPHIN COUNTY, PENNSYLVANIA — SHEET NUMBER 7

469 000 FEET

2 260 000 FEET

(Joins sheet 2)

(Joins sheet 6)

(Joins sheet 8)

(Joins sheet 12)

2 280 000 FEET

456 000 FEET

7

N

1 Mile

5 000 Feet

Scale 1:15 840

Berrysburg

Hoffmans School

Hoffmans Church

Tises School

MIFFLIN

LYKENS

WASHINGTON

WICONISCO

WICONISCO CREEK

CIB2 CIC2 CIA KaD2 AbA KaE2 AbB2 BtB2 BtA CkD2 At Bc Lw Rv AbA CkC2 KaB2 LaB2 BvB LdD DIF DIB St Bb

8

N

1 Mile

5 000 Feet

Scale 1:15 840

0 1 000 2 000 3 000 4 000 5 000

469 000 FEET

2 280 000 FEET

2 300 000 FEET

456 000 FEET

(Joins sheet 3)

(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 13)

Simeons Church

Gratz

COUNTY FAIRGROUNDS

Saladds School

L Y K E N S

C O A L O R T H I C K M O U N T A I N

W I C O N I S C O

Bear Creek

BIG LICK MOUNTAIN

CIA CIB2 CIC2 CkC2 CkD2 KaD2 KaE2 AbA AbB2 BtA BtB2 Bc At CaB CoB2 LaB2 LaC2 LdB LdD BvB DIB DIC DID DIF KaB2 AoB Mu St Md

(Joins sheet 4)

469 000 FEET

2 300 000 FEET

(Joins sheet 8)

L Y K E N S

C O A L

T H I C K

M O U N T A I N

C O N I S

B I G

L I C K

M O U N T A I N

W I L L I A M S

SCHUYLKILL COUNTY

Bear Creek

Wiconisco Creek

WILLIAMSTOWN

ABANDONED MINE TUNNEL

ABANDONED MINE TUNNEL

BIG LICK MINE TUNNEL

PENN CENTRAL

PENN CENTRAL

READING

CaB LdD DID DIF St Md LdB Rv Mu BvB AoB LaC2 LaB2 CIB2 CIC2 KaD2

(Joins inset B, sheet 4)

2 320 000 FEET

(Joins sheet 14)

456 000 FEET

9

N

1 Mile

5 000 Feet

Scale 1:15 840

1 5 000 ¾ 4 000 ½ 3 000 ¼ 2 000 0 1 000 0

10

N

456 000 FEET

2 220 000 FEET

(Joins sheet 5)

Susquehanna R.

PENN CENTRAL

147

MAHANTANGO MOUNTAIN

Fairview School

Pleasant Hills

Salems Church

Killinger

Little Wiconisco Creek

UPPER PAXTON

MILLERSBURG

25

209

(Joins sheet 16)

(Joins sheet 17)

(Joins sheet 11)

443 000 FEET

2 240 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 6)

456 000 FEET

2 240 000 FEET

(Joins sheet 10)

(Joins sheet 12)

(Joins sheet 18)

2 260 000 FEET

443 000 FEET

11

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

1/4 1 000

1/2 2 000

3/4 3 000

1 4 000

5 000

M A J O N

F F L I N

P A X T O N

W A S H I N G T O N

U P P E R

Rife School

Rife

Upper Dauphin High School

MAPLE GROVE CEMETERY

ELIZABETHVILLE

WICONISCO CREEK

PENN CENTRAL

209

225

CIB2 CIC2 CIA AbA AbB2 BtA BtB2 CkC2 CkD2 KaD2 KaE2 Bc Bb At Lw Rv CmB2 CoB2 Md BuB LaB2 LaC2

N

456 000 FEET

2 260 000 FEET

(Joins sheet 7)

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 5 000

(Joins sheet 11)

(Joins sheet 19)

(Joins sheet 13)

2 280 000 FEET

443 000 FEET

WICONISCO CREEK

LYKENS

WASHINGTON

BERRY

MOUNTAIN

JACKSON

Oakdale Church

Boyer School

Stone Hill School

Loyalton

Oakdale Station

ELIZABETHVILLE

HALDEMAN STATE FOREST

PENN CENTRAL

TRAIL

CIA CIB2 CIC2 AbA AbB2 BtA BtB2 At Bb Bc Lw Rv KaD2 KaE2 CkD2 CkC2 BuB LaB2 LaC2 LdB LdD DIF DID DIB St Md AnB CaD

(Joins sheet 8)

456 000 FEET

2 280 000 FEET

(Joins sheet 12)

(Joins sheet 14)

(Joins sheet 20)

443 000 FEET

2 300 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840

1 0 1 000 ¼ 2 000 ½ 3 000 ¾ 4 000 1 5 000

SHORT MOUNTAIN

WASHINGTON

BERRY

JACKSON

WICONISCO

LYKENS

WICONISCO

CEMETERY

HALDEMAN STATE FOREST

PENN CENTRAL

READING

TRAIL

Bear Creek

Wiconisco Creek

Rattling Creek

East Branch Rattling Creek

West Branch Rattling Creek

Slate Run

Cabin Run

DIB DID DIF LdD LaB2 LaC2 CIB2 CIC2 KaD2 KaE2 BuB BvB BtA Md Us Rv Ua Ub Ph At Bb BdB AbB2 CkC2 Lw

N

456 000 FEET

2 300 000 FEET

(Joins sheet 9)

PENN CENTRAL

READING

WILLIAMSTOWN

Creek

Wiconisco

W I L L I A M S

W I C O N I S C O

J A C K S O N

J E F F E R S O N

R U S H

MOUNTAIN

BERRY MOUNTAIN

Reservoir

East Branch Rattling Creek

PETERS MOUNTAIN

Z09

LdB LdD LaB2 LaC2 CIB2 CEM AbA AbB2 Ph CIC2 Rv AoB Ub AnB VsF BvB BvF BuB DIF DID DIB

1 Mile

5 000 Feet

Scale 1:15 840

1 5 000 0 0 ¾ 4 000 ½ 3 000 ¼ 2 000 0 1 000

(Joins sheet 13)

(Joins sheet 15)

(Joins sheet 21)

2 320 000 FEET

443 000 FEET

(Joins inset B, sheet 4)

456 000 FEET

2 320 000 FEET

W I L L I A M S

J A C K S O N

J E F F E R S O N

R U S H

PETERS MOUNTAIN

SCHUYLKILL COUNTY

LEBANON COUNTY

Clark Creek

DIF DID DIB LdD LdB LaC2 CIB2 CIC2 BtA AbB2 AbA At CkD2 BuB BtB2 LaB2 AoB AoE2 CaD AnB Cr RdB2 Ph

325

(Joins sheet 14)

(Joins sheet 22)

443 000 FEET

2 340 000 FEET

15

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

N

1 Mile

5 000 Feet

0 0 Scale 1:15 840

1/4 1 000

1/2 2 000

3/4 3 000

1 4 000 5 000

456 000 FEET

2 209 800 FEET

(Joins inset B, sheet 1)

443 000 FEET

2 212 200 FEET

(Joins lower left)

(Joins sheet 10)

(Joins upper right)

443 000 FEET

2 220 000 FEET

(Joins sheet 17)

(Joins sheet 23)

430 000 FEET

2 220 000 FEET

PERRY COUNTY

SUSQUEHANNA RIVER

MAHANTANGO MOUNTAIN

UPPER PAXTON

MILLERSBURG

Lenkerville

WICONISCO CREEK

OAK HILL CEMETERY

PENN CENTRAL

BERRY MOUNTAIN

HALIFAX

Rv VsF DIF BuB LaC2 CIB2 LaB2 CIC2 Bc KaE2 CkD2 DvB2 Lt Ta CIA AbB2 CmB2 LeB2 DvA LdD DID Lw

(Joins sheet 10)

443 000 FEET

2 220 000 FEET

MILLERSBURG

Lenkerville

Little Wiconisco Creek

Wiconisco Creek

Reservoir

Pumping Station

Power Plant

PENN CENTRAL

UPPER PAXTON

WICONISCO CREEK

PENN CENTRAL

MOUNTAIN

BERRY

HALIFAX

JACKSON

Rush Creek

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 24)

430 000 FEET

2 240 000 FEET

17

N

1 Mile

5 000 Feet

Scale 1:15 840

N

1 Mile

5 000 Feet

Scale 1:15 840

1 0 1 000 2 000 3 000 4 000 5 000

BtB2 443 000 FEET

2 240 000 FEET

(Joins sheet 11)

(Joins sheet 17)

(Joins sheet 19)

(Joins sheet 25)

2 260 000 FEET

430 000 FEET

UPPER PAXTON

WASHINGTON

JACKSON

MOUNTAIN

BERRY

WICONISCO CREEK

PENN CENTRAL

Dietrich

St Jacobs Church

Armstrong Creek

KaD2 CIB2 CIC2 AbB2 CIB2 CIC2 KaE2 Lw Bb CIC2 KaE2 CIC2 Bb KaD2 CIA KaD2 CIB2 AbB2 At KaD2 CIC2 CIB2 KaE2 Ph At Rw CIC2 LaC2 Bb AnB Bc CIC2 LaC2 LdD Lw Lw Bc KaD2 CIC2 KaE2 CkD2 LdD Lw Lw PENN CENTRAL DIF DID DIF DID DIF DID DIF DID DIF LdD LdB LdD DIF DID LdB AbB2 AbA KaB2 KaC2 CkC2 CkD2 BtB2 DcC2 DcB2 CoB2 BhB2 BhC2 CaD CaF CaB DIB BuB LaB2 LaC2 BtB2 BtC2 BtD2 BkD2 AsB2 AsC2 AsD2 225 209 275

N

443 000 FEET

2 260 000 FEET

(Joins sheet 12)

(Joins sheet 18)

(Joins sheet 20)

(Joins sheet 26)

430 000 FEET

2 280 000 FEET

WASHINGTON

BERRY

MOUNTAIN

HALDEMAN

JACKSON

BROAD

STATE

FOREST

MOUNTAIN

JEFFERSON

Armstrong Creek

St Pauls Church

TRAIL

MATTER TRAIL

LUKES TRAIL

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

20

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

443 000 FEET

2 280 000 FEET

(Joins sheet 13)

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 27)

2 300 000 FEET

430 000 FEET

MATTER TRAIL

TRAIL

Rattling Run

Stony Run

Hunt Run

Branch

West

Wolf Run

Creek

Fork

Powell

South

LUKES TRAIL

LUKES TRAIL

Sposhty Kopf

Boy Scout Camp

NEW HANOVER

JACKSON

MIDDLE

PENNSYLVANIA

MOUNTAIN

BROAD

JEFFERSON

DID DIB DIF LdB BvB LaC2 LaB2 CIC2 CIB2 AbA AbB At CaB CaD CaF LdD

(Joins sheet 14)

443 000 FEET

2 300 000 FEET

JACKSON

JEFFERSON

PETERS

MOUNTAIN

RUSH

MOUNTAIN

STONY

LEBANON COUNTY

Spechty Kopf

Powell Creek

Powell Creek

South Fork

Clark Creek

Clark Creek

TRAIL

TRAIL

325

DIF DID DIB BvB LdB AnB CkC2 DcB2 LaB2 LaC2 CaF CaD CaB BuB CaB2 CkD2 At AoB CIB2 CIA AbB2 LdD VsC

(Joins sheet 20)

(Joins sheet 22)

(Joins sheet 28)

2 320 000 FEET

430 000 FEET

21

N

1 Mile

5 000 Feet

Scale 1:15 840

1 ¼ ½ ¾ 1

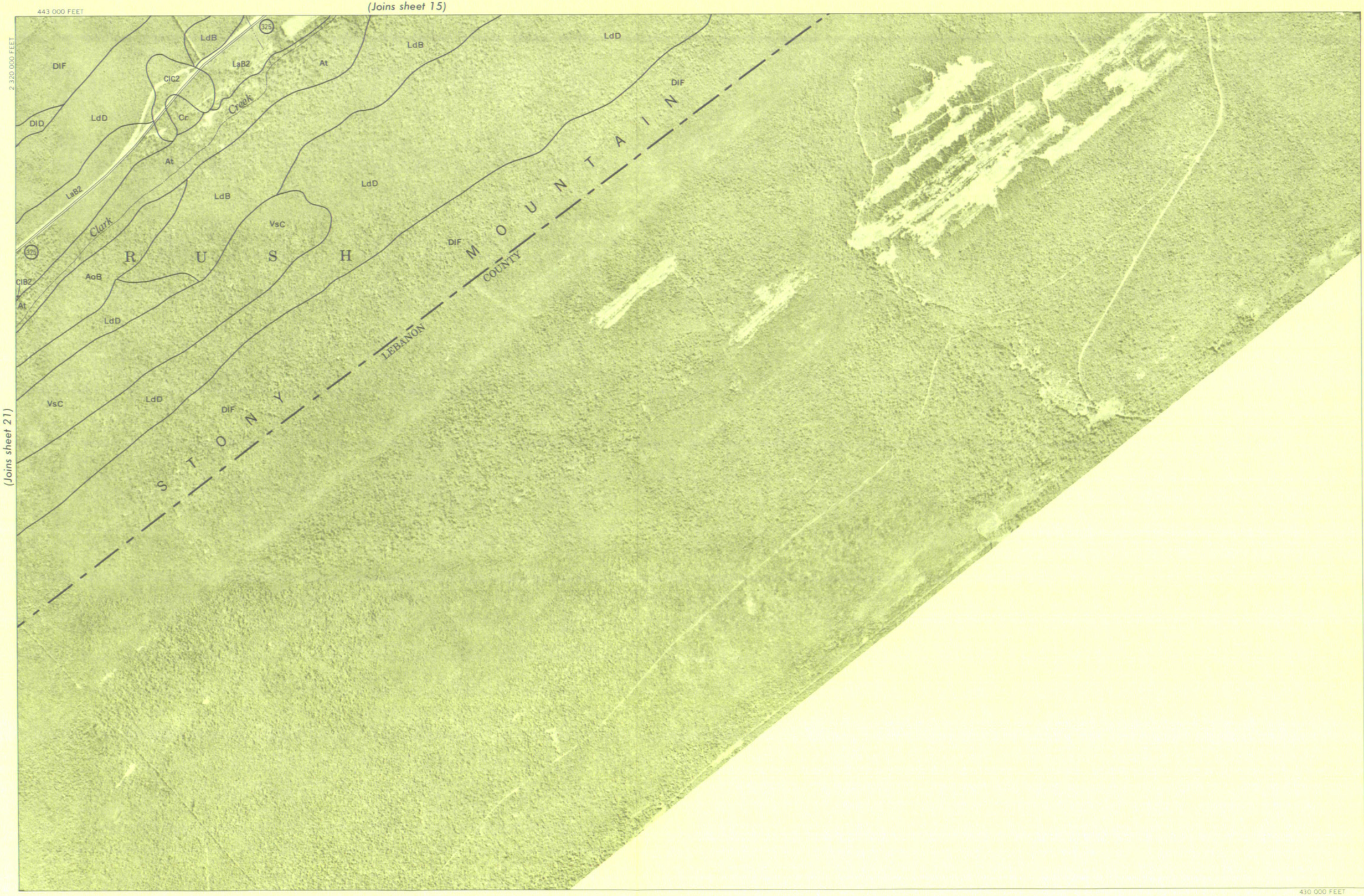
0 1 000 2 000 3 000 4 000 5 000

N

443 000 FEET

(Joins sheet 15)

2 320 000 FEET



(Joins sheet 21)

Scale 1:15 840

1 Mile — 5 000 Feet

1 — ¾ — ½ — ¼ — 0

5 000 — 4 000 — 3 000 — 2 000 — 1 000 — 0

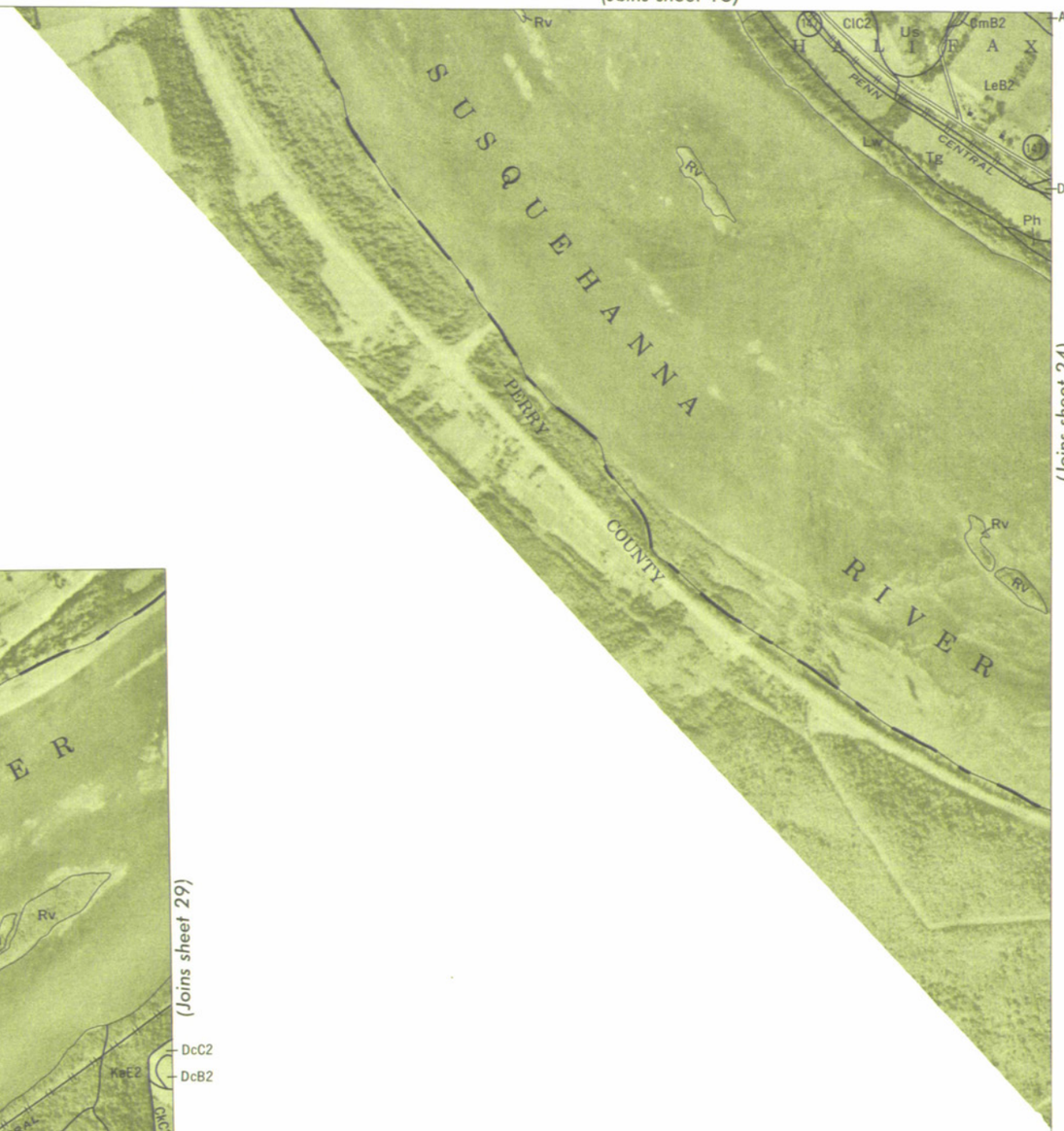
430 000 FEET

2 340 000 FEET

430 000 FEET

2 200 000 FEET

(Joins sheet 16)



(Joins sheet 24)

410 000 FEET

2 211 400 FEET

(Joins sheet 29)

2 220 000 FEET

404 000 FEET

(Joins sheet 33)

N

1 Mile

5 000 Feet

Scale 1:15 840

1 ¾ ½ ¼ 0 0 ¼ ½ ¾ 1

5 000 4 000 3 000 2 000 1 000 0 1 000 2 000 3 000 4 000 5 000

2 220 000 FEET

417 000 FEET

24

N

430 000 FEET

(Joins sheet 17)

2 220 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 23)

(Joins sheet 25)

(Joins sheet 29)

2 240 000 FEET

417 000 FEET

SUSQUEHANNA RIVER

PERRY COUNTY

DAUPHIN COUNTY

Clempson Island

Lingle Island

Gurdy

England

Armstrong Creek

PENN CENTRAL

PHILADELPHIA

Rv

Tg

Lw

Ph

At

Bc

Lt

Ta

Us

Bb

CnA

BtA

LeB2

DvB2

DvA

AbB2

BtB2

BhB2

BhC2

BkD2

WeE2

WeD2

CkC2

CkD2

CoB2

ClB2

ClC2

KaE2

AbB2

DcB2

DcC2

25

N

430 000 FEET

2 240 000 FEET

(Joins sheet 18)

(Joins sheet 24)

(Joins sheet 26)

(Joins sheet 30)

2 260 000 FEET

417 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

Fisherville

Messiah Church

Fisherville School

Armstrong

Armstrong Valley Church

Enders

Enders Fisherville School

Straws Union Church

JACKSON

MAYNE DRIVING

MAYNE RIDGE

26

N

430 000 FEET

(Joins sheet 19)

2 260 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 5 000

(Joins sheet 25)

(Joins sheet 31)

(Joins sheet 27)

2 280 000 FEET

417 000 FEET

HALDEMAN STATE FOREST

JACKSON

JEFFERSON

WAYNE

PETERS MOUNTAIN

Carsonville

Carsonville School

Trinity Church

Powell Creek

North Fork

South Fork

TRAIL

CkC2 CkD2 KaD2 KaE2 CIC2 CIB2 CIA DcB2 DcC2 AbA AbB2 At Bc BtA BtB2 LaB2 LaC2 CaB CaD CaF AoB BvB DIB DID DIF LdB LdD

(Joins sheet 20)

430 000 FEET

2 280 000 FEET

HALDEMAN ST FOR

(Joins sheet 26)

(Joins sheet 28)

(Joins sheet 32)

2 300 000 FEET

417 000 FEET

27

N

1 Mile

5 000 Feet

Scale 1:15 840

1 0 ¼ ½ ¾ 5 000 4 000 3 000 2 000 1 000 0

JEFFERSON

PETERS

MOUNTAIN

Round Top

Creek

Powell

Fork

North

South

TRAIL

RESERVOIR

SUPPLY

WATER

HARRISBURG

STONY MOUNTAIN

LEBANON CO.

325

DIF LdD LaC2 LaB2 CaB CaD CaF BvB DID AbA At CIB2 AbB2 CIC2 KaD2 CkD2 KaE2 BuB DIB VsF DcB2 DcC2 Bc CIA BkB2 BtB2 CkC2 LdB

(Joins sheet 21)

(Joins sheet 27)

N

1 Mile

5 000 Feet

Scale 1:15 840

0 — 0 — 1 000 — ¼ — 2 000 — ½ — 3 000 — ¾ — 4 000 — 5 000 — 1

N

417 000 FEET

2 200 000 FEET

(Joins sheet 24)

(Joins inset, sheet 23)

(Joins sheet 30)

(Joins sheet 34)

2 240 000 FEET

404 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

PERRY COUNTY

SUSQUEHANNA RIVER

BRESSLER

OLMPSON ISLAND

ISLAND

Halifax

Armstrong Creek

Powell Creek

DIVIDING RIDGE

HALIFAX

Matamoras

CENTRAL PENN

30

N

417 000 FEET

2 240 000 FEET

(Joins sheet 25)

(Joins sheet 29)

(Joins sheet 31)

(Joins sheet 35)

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

1¼ 5 000

JACKSON RIDGE

MIDDLE PAXTON

PETERS MOUNTAIN

Enterline

Enterline School

St Pauls Church

Waynesville

Waynesville School

Jacobs Church

Bc Creek

Powell

Clark

404 000 FEET

2 260 000 FEET

325

DAUPHIN COUNTY, PENNSYLVANIA — SHEET NUMBER 31

417 000 FEET

2 260 000 FEET

(Joins sheet 26)

(Joins sheet 30)

(Joins sheet 32)

(Joins sheet 36)

2 280 000 FEET

404 000 FEET

31

N

1 Mile

5 000 Feet

Scale 1:15 840

Union Church

Powell Valley Church

Powell Creek

South Fork Powell

Clark Creek

Harrisburg Water Supply Reservoir

WAYNE

JEFFERSON

MOUNTAIN

PETERS

MIDDLE PAXTON

RUSH

STONY MOUNTAIN

EAST HANOVER

MIDDLE PAXTON

(32)

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ 1 000 ½ 2 000 ¾ 3 000 1 4 000 5 000

DIF 417 000 FEET

2 280 000 FEET

(Joins sheet 27)

(Joins sheet 31)

(Joins sheet 37)

(Joins inset, sheet 38)

2 230 000 FEET

404 000 FEET

RESERVOIR

SUPPLY

WATER

HARRISBURG

R U S H

M O U N T A I N

S H A R P

S T O N Y

E A S T H A N O V E R

M O U N T A I N

S E C O N D

M O U N T A I N

LEBANON COUNTY

INDIANTOWN GAP MILITARY RESERVATION

Creek

Stony

DIB DID DIF LdD VsC VsF BvB LaC2 At AoB CaB CaD

(Joins inset 23)

404 000 FEET

2 200 000 FEET

PERRY COUNTY

DUNCAN ISLAND

HALDEMAN ISLAND

SUSQUEHANNA RIVER

JUNIATA RIVER

WILLIAM PENN HIGHWAY

GRAVEL PIT

PENN CENTRAL

West Fall Island

Inglenook

Benvenue

Powell Creek

HALIFAX

Tg Rv Lw Lt Ta Ua Us

CnB2 CnC2 CnA LaB2 LeB2 DvB2 DvA

BhB2 BhC2 BkD2 KaE2 KaD2 AbB2 ClC2 KaB2 DcC2 DcB2 ClB2 DcC2 CkC2 CkD2 AbA BtB2 ClA BtA At Bb Bc CaD CaF AoB BvB LdB LdD DlF VsF

147

(Joins sheet 34)

(Joins sheet 39)

391 000 FEET

2 220 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840

1 0 1 000 2 000 3 000 4 000 5 000

N

404 000 FEET

(Joins sheet 29)

2 220 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 33)

(Joins sheet 35)

(Joins sheet 40)

2 240 000 FEET

391 000 FEET

Matamoras

Powells Valley

Bc Creek

Powell

Great Bb

Clark

H A L I F A X

M O U N T A I N

M I D D L E P A X T O N

P E T E R S

T O W N S H I P

CkC2 CkD2 CkD2 KaD2 CIC2 CIC2 KaE2

DcC2 DcB2 CIB2 KaE2 CkC2 CkD2 KaD2 CIC2 CIB2 BtB2 KaC2 AbB2 At Bc Bb BhB2 BhC2 BtB2 CIA BuB BvB AbA LaC2 KaB2 DcC2 DIF LdD LdB AoB CaF CaD VsF DID

(Joins sheet 30)

404 000 FEET

2 240 000 FEET

(Joins sheet 34)

(Joins sheet 36)

(Joins sheet 41)

391 000 FEET

2 260 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

WAYNE MOUNTAIN

HALIFAX PETERS MIDDLE PAXTON THIRD MOUNTAIN

Bowell Creek

Clark Creek

Stony Creek

CAMP SHIKELLIMY YMCA

325

KaE2 At ClB2 AbB2 BkB2 CkD2 ClC2 CaB BtA AbA ClA Ph Bc AoB CaD DlF LdD DlD BuB LaC2 LaB2 AnB BvB Bb CaF VsF DlB

N

404 000 FEET

2 260 000 FEET

(Joins sheet 31)

(Joins sheet 35)

(Joins sheet 37)

(Joins sheet 42)

391 000 FEET

2 280 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

Clark Creek

Story Creek

RUSH

EAST HANOVER

THIRD MOUNTAIN

SECOND MOUNTAIN

MIDDLE PAXTON

WEST HANOVER

SEEDED AREA

SEEDED AREA

TRAIL

Radio Tower

LaB2 ClB2 ClC2 Bb At AoB LdD DlD DlF DlB VsF VsC BvB AbB2 AbA ClA CaF CaB CaD BtA LdB

404 000 FEET

2 280 000 FEET

(Joins sheet 32)

(Joins sheet 36)

(Joins sheet 38)

(Joins sheet 43)

391 000 FEET

2 300 000 FEET

37

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

4 000

5 000

1

EAST HANOVER

SECOND

MOUNTAIN

INDIANTOWN GAP MILITARY RESERVATION

WEST HANOVER

BLUE MOUNTAIN

Shiny Creek

Manada Creek

DlD DlF VsF VsC LdD LdB At AoB DlF DlB CaD CaB CkC2 CkD2 ClB2 ClC2 AbB2 KaD2 KaE2 BvB AnB BuB BkB2 BkC2 LaB2 BtB2 Bc CoB2

(Joins inset)

(Joins sheet 37)

(Joins sheet 32)

(Joins upper left)

(Joins sheet 44)

(Joins sheet 33)

391 000 FEET

2 200 000 FEET

39

N

Benvenue

HALDEMAN ISLAND

Duncan Island

WILLIAM PENN HIGHWAY

CLARKS FERRY BRIDGE

PENN CENTRAL

R E E D M O U N T A I N

P E T E R S

M I D D L E P A X T O N

S U S Q U E H A N N A R I V E R

PERRY COUNTY

Speeceville

HIGHLAND CEMETERY

Speeceville Church

WILLIAM PENN HIGHWAY

PENN CENTRAL

Susquehanna R

CaD CaF DIF LdD VsF Ua Ta Tg CnB2 CnC2 CkD2 DvB2 LaC2 LaB2 BuB CkC2 CIB2 CIC2 CIA KaE2 KaD2 AbB2 BtB2 BtA AnB At LrB2 Bc

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 40)

(Joins sheet 45)

378 000 FEET

2 220 000 FEET

(40)

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

391 000 FEET

2 220 000 FEET

(Joins sheet 34)

(Joins sheet 39)

(Joins sheet 41)

(Joins sheet 46)

2 240 000 FEET

378 000 FEET

REED MOUNTAIN

PETERS MOUNTAIN

MIDDLE PAXTON

THIRD MOUNTAIN

SECOND MOUNTAIN

Middle Paxton Consolidated School

Singersville

Dauphin

Clark Creek

Stony Creek

Stony Creek Reservoir

WILLIAM PENN HIGHWAY

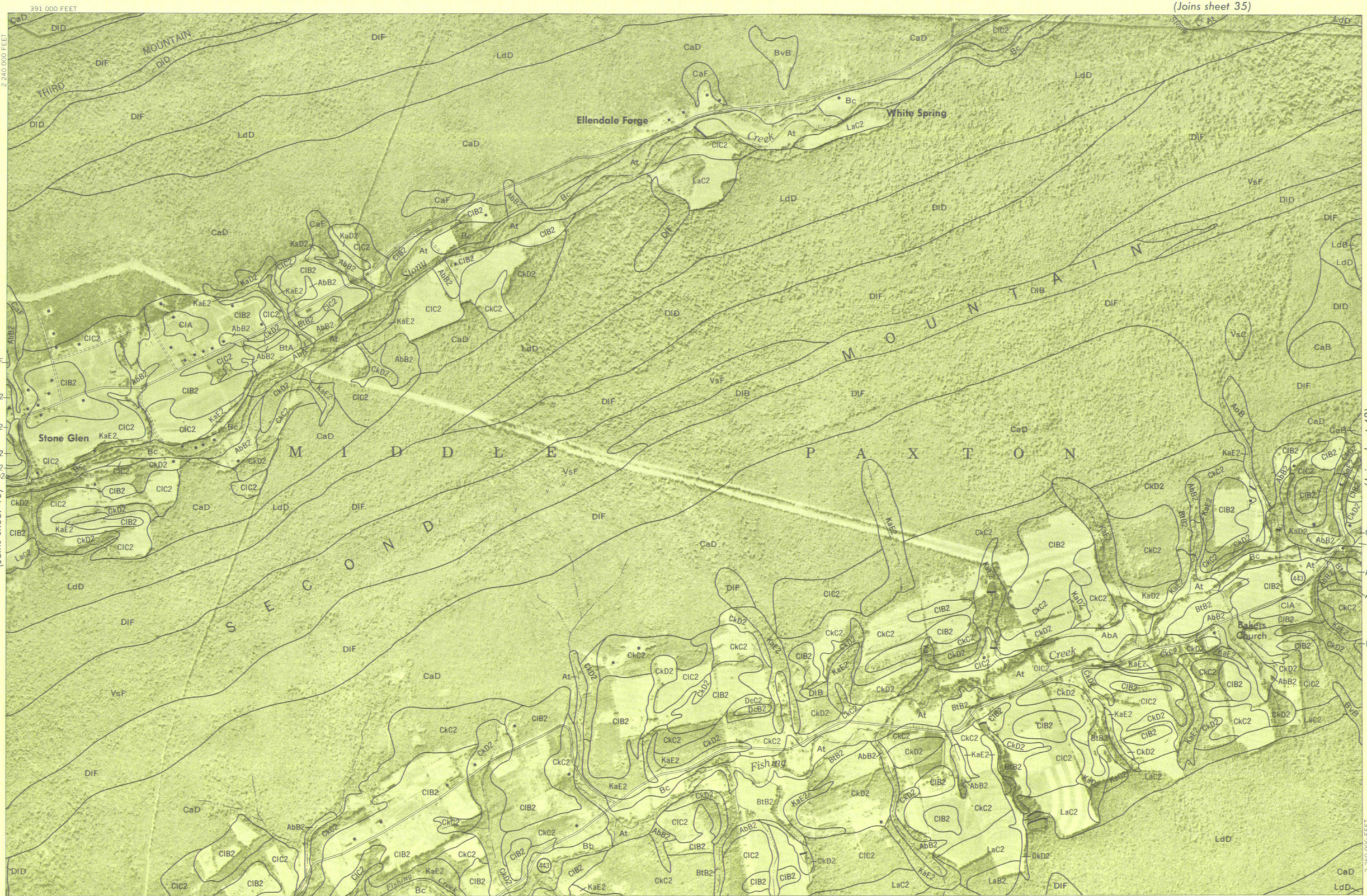
PENN CENTRAL

DIF VsF LdD CIC2 CIB2 CkD2 CkC2 KaE2 AbB2 BvB CaD DlD CaF LaC2 BuB LaB2 AoB BtB2 KaD2 BtA AbA CIA At Bc Bb Ph Ua Tg AnB DcC2 LrC2 LrB2 KaB2 BtB2

(Joins sheet 35)

391 000 FEET

2 240 000 FEET



(Joins sheet 40)

(Joins sheet 42)

(Joins sheet 47)

2 260 000 FEET

378 000 FEET

41

N

1 Mile

5 000 Feet

Scale 1:15 840

N

391 000 FEET

(Joins sheet 36)

2 260 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

MOUNTAIN

SECOND

WEST HANOVER

MIDDLE PAXTON

BLUE MOUNTAIN

LOWER PAXTON

Creek

Mt Laurel Church

Piketown

Gap

Heckert

QUARRY

(Joins sheet 41)

(Joins sheet 43)

(Joins sheet 48)

2 280 000 FEET

378 000 FEET

(Joins sheet 37)

(Joins sheet 42)

(Joins sheet 44)

(Joins sheet 49)

391 000 FEET

2 280 000 FEET

378 000 FEET

2 300 000 FEET

43

N

1 Mile

5 000 Feet

15 840

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

INDIANTOWN GAP MILITARY RESERVATION

MOUNTAIN

BLUE

MOUNTAIN

WEST HANOVER

EAST HANOVER

Manada Gap

Manada Furnace Church

Manada Creek

LOCATION

APPROXIMATE

Shellsville

81

443

N

391 000 FEET

(Joins sheet 38)

2 300 000 FEET

1 Mile

5 000 Feet

(Joins sheet 43)

Scale 1:15 840

(Joins sheet 50)

EAST HANOVER

Grantville

St Johns Church

Shellsville

LEBANON COUNTY

APPROXIMATE LOCATION

PENN WILLIAM HIGHWAY

2 320 000 FEET

378 000 FEET

N

(Joins sheet 39)

(Joins sheet 46)

378 000 FEET

2 200 000 FEET

365 000 FEET

2 220 000 FEET

MIDDLE PAXTON

SUSQUEHANNA RIVER

PERRY COUNTY

WILLIAM PENN HIGHWAY

PENN CENTRAL

Rv

Tg

Ta

Tp

At

KaE2

CkD2

DlB2

22 322

323 22

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

0 1 000 2 000 3 000 4 000 5 000

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0 ¼ 1 000 ½ 2 000 ¾ 4 000 1 5 000

378 000 FEET

2 220 000 FEET

(Joins sheet 40)

(Joins sheet 45)

(Joins sheet 47)

(Joins sheet 51)

2 240 000 FEET

365 000 FEET

SUSQUEHANNA RIVER

PERRY COUNTY

SECOND MOUNTAIN

MIDDLE PAXTON

BLUE MOUNTAIN

Dauphin

Heckton

Fort Hunter

Rockville

Stony Creek Reservoir

Fishing Creek

YWCA Camp

HARRISBURG COUNTRY CLUB

ROCKVILLE BRIDGE

PENN CENTRAL

PENN CENTRAL READING

Tg Ph Lw At Ua Bc CaF CkD2 LaC2 KaE2 ClB2 DlF VsF DlD LdD AbB2 ClC2 DcB2 CaD KaC2 DuB2 LeB2 DvB2 DvA Lt Rv Ta WeE2

(47)

N

(Joins sheet 41)

(Joins sheet 46)

(Joins sheet 48)

(Joins sheet 52)

378 000 FEET

365 000 FEET

2 240 000 FEET

2 260 000 FEET

Scale 1:15 840

1 Mile

5 000 Feet

Trinity Church

Fishing Creek

Bb Ct

BLUE RIDGE COUNTRY CLUB

QUARRY

M I D D L E P A X T O N M O U N T A I N

L O W E R P A X T O N

B L U E S U S Q U E H A N N A

48

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

378 000 FEET

2 260 000 FEET

(Joins sheet 42)

(Joins sheet 47)

(Joins sheet 49)

(Joins sheet 53)

2 280 000 FEET

365 000 FEET

MIDDLE PAXTON MOUNTAIN

BLUE

WEST HANOVER

LOWER PAXTON

Linglestown

Linglestown School

Wenrich Church

Beaver Creek

APPROXIMATE LOCATION

WILLIAM PENN HIGHWAY

LdD DIF DIB LaC2 LaB2 BvB AoB Ph BkB2 BkC2 BkD2 WeE2 WeC2 WeD2 BtB2 BtA At CoB2 CoC2 CoD2 CkC2 CkD2 ClB2 BeC2 BeB2 KaB2 KaD2 KaE2 AhB2 RhB2 DcC2

(Joins sheet 43)

(Joins sheet 48)

(Joins sheet 50)

(Joins sheet 54)

378 000 FEET

365 000 FEET

2 280 000 FEET

2 300 000 FEET

49

N

1 Mile

5 000 Feet

Scale 1:15 840

Shellsville

Manadahill Church

Manadahill

West Hanover School

Skyline View

EAST HANOVER

WEST HANOVER

Mahada Creek

Rutters Run

Spring Creek

Beaver Creek

Mahantongo Creek

Penn Highway

William Penn Highway

Highway 22

Approximate

N

378 000 FEET

2 300 000 FEET

(Joins sheet 44)

(Joins sheet 49)

(Joins sheet 55)

365 000 FEET

2 320 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

EAST HANOVER

LEBANON COUNTY

SWATARA CREEK

Lw

Ph

At

BkB2 BkC2 BkD2 BeA BeB2 BeC2 BtA BtB2 CoB2 KaB2 KaC2 KaD2 KaE2 WeC2 WeD2 WeE2 AbA Qt-Aeol

(Joins sheet 46)

365 000 FEET

2 220 000 FEET

READING
PENN CENTRAL
ROCKVILLE BRIDGE

PERRY COUNTY

CUMBERLAND COUNTY

SUSQUEHANNA RIVER

Lucknow

Estherton

HARRISBURG
(state capital and county seat)

McCormicks Island

Wildwood Lake

water

DUMP

DlF
LaC2
WaE2
DvB2
BkD2
Tg
Ua
Ph
BkC2
CnB2
Rv
Lw
Ta
Ub
w
Ma

(Joins sheet 52)

(Joins sheet 56)

352 000 FEET

2 240 000 FEET

51
N

1 Mile
5 000 Feet

Scale 1:15 840

0 0
¼ 1 000
½ 2 000
¾ 3 000
1 4 000
5 000

N

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

365 000 FEET

2 240 000 FEET

(Joins sheet 47)

(Joins sheet 51)

(Joins sheet 57)

(Joins sheet 53)

Herbert Hoover School

Beaufort Farms

Windsor Farms

Wildwood Lake

Susquehanna School

COLONIAL PARK

HARRISBURG (state capital and county seat)

WILDWOOD CREST PUBLIC GOLF COURSE

SUSQUEHANNA

LOWER PAXTON

Paxton Creek

water

DUMP

QUARRY

INTERSTATE HIGHWAY NO 81

APPROXIMATE CENTER OF CITY

SHOOPS CEMETERY

352 000 FEET

365 000 FEET

2 260 000 FEET

(Joins sheet 48)

53

N

1 Mile

5 000 Feet

Scale 1:15 840

Linglestown

Mountain View School

Pleasant Hills

Paxtonia School

Lower Paxton Jr High School

Paxtonia

Ridgeview

Northside School

COLONIAL PARK

LOWER PAXTON

WEST HANOVER

SOUTH HANOVER

RESURRECTION CEMETERY

BLUE RIDGE MEMORIAL GARDENS CEMETERY

HIGHWAY

WILLIAM PENN

APPROXIMATE LOCATION

(Joins sheet 52)

(Joins sheet 54)

(Joins sheet 58)

352 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840

365 000 FEET

2 280 000 FEET

(Joins sheet 49)

(Joins sheet 53)

(Joins sheet 59)

(Joins sheet 55)

352 000 FEET

2 230 000 FEET

RESURRECTION CEMETERY

WEST HANOVER

EAST HANOVER

SOUTH HANOVER

NORTH HANOVER

Hanoverdale

Manada Creek

Beaver Creek

Lower Paxton

Kellock Run

BkB2 BkC2 BkD2 BeB2 BeC2 BeA BtA BtB2 CoB2 WeD2 WeE2 WeC2 KaB2 KaC2 KaD2 KaE2 ClB2 ClC2 CmB2 CnA At Ph

(Joins sheet 50)

(Joins sheet 54)

(Joins sheet 60)

365 000 FEET

352 000 FEET

2 300 000 FEET

2 320 000 FEET

55

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0 1 000 ¼ 2 000 ½ 3 000 ¾ 4 000 1 5 000

EAST HANOVER

NORTH ANNVILLE

SOUTH ANNVILLE

SWATARA CREEK

MANADA CREEK

QUARRY

CEMETERY

GOLF COURSE

Sandbeach

Hershey School

Hershey Zoo

READING

LEBANON

COUNTY

HIGHWAY

BENJAMIN FRANKLIN

PALMDALE

N

352 000 FEET

2 220 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 51)

McCormicks Island

Ta

Lw

Rv

Ua

Ma

PENN CENTRAL

William Penn High School

HARRISBURG

(state capital and county seat)

SUSQUEHANNA RIVER

CUMBERLAND COUNTY

(Joins sheet 57)

(Joins lower right)

339 000 FEET

2 324 840 FEET

HARVEY TAYLOR BR

SUSQUEHANNA RIVER

CUMBERLAND COUNTY

City Island

WALL ST BR

2 240 000 FEET

334 450 FEET

(Joins sheet 61)

HARVEY TAYLOR BRIDGE

(Joins inset)

339 000 FEET

(Joins sheet 52)

(Joins sheet 56)

(Joins sheet 58)

(Joins sheet 61)

352 000 FEET

2 240 000 FEET

2 260 000 FEET

339 000 FEET

57

N

1 Mile

5 000 Feet

Scale 1:15 840

SUSQUEHANNA

SWATARA

QUARRY

Glenwood School

Edgemont

Glenwood

PROGRESS

Susquehanna Jr High School

CEMETERY

LINCOLN CEMETERY

Woodward School

PENBROOK

HARRISBURG CEMETERY

Reservoir

PROSPECT HILL CEMETERY

John Harris High School

Paxtang Manor

BETHEL CEMETERY

Lenker Manor

HARRISBURG

(state capital and county seat)

State Capitol

Webster School

Melrose School

PAXTANG

OAKLEIGH

Penn Reading Central

Creek

Ma Ua Us Ub Lt CnA DvA DvB2 LeB2 BkB2 BkC2 BkD2 BeA BeB2 BeC2 BtA BtB2 CoB2 WeE2 WeC2 WeD2 At Ph

N

352 000 FEET

2 260 000 FEET

(Joins sheet 53)

Central Dauphin High School

COLONIAL PARK

St Anne Church

E H Phillips School

L O W E R P A X T O N

East High School

WOODLAWN MEMORIAL GARDENS CEMETERY

Lakeview Heights

South Side School

Rutherford Heights

RUTHERFORD HEIGHTS

Paxton Church

LAWNTON

Spring Creek

READING

BENJAMIN FRANKLIN HIGHWAY

1 Mile

5 000 Feet

Scale 1:15 840

0 1/4 1/2 3/4 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 57)

(Joins sheet 59)

(Joins sheet 62)

339 000 FEET

2 280 000 FEET

(Joins sheet 54)

(Joins sheet 58)

(Joins sheet 60)

(Joins sheet 63)

352 000 FEET

2 280 000 FEET

339 000 FEET

2 300 000 FEET

59

N

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

Hoernerstown

St Johns Church

Union Deposit

Pleasant View

HUMMELSTOWN

Lower Dauphin High School

SOUTH HANOVER

SWATARA

LOWER PAXTON

DERRY

Beaver Creek

Killock Run

SWATARA CREEK

Lt Creek

Spring

READING

BENJAMIN FRANKLIN HIGHWAY

GOLF COURSE

CEMETERY

N

(Joins sheet 55)

At Lw 352 000 FEET

2 300 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 59)

(Joins sheet 64)

(Joins inset, sheet 65)

2 320 000 FEET

339 000 FEET

SWATARA CR

GOLF COURSE

READING

FRANKLIN

HIGHWAY

Spring Creek

Spring

Spring Creek Church

HERSHEY

St Joan of Arc Church

Derry School

DERRY

Hershey Farm School

Hospital

Balsbaugh Church

Hockersville

Fishburns Church

Hershey Church

LEBANON

COUNTY

QUARRY

BENJAMIN

Swatara

(Joins sheet 57)

(Joins inset, sheet 56)

(Joins sheet 62)

(Joins inset, sheet 70)

339 000 FEET

2 240 000 FEET

2 260 000 FEET

326 000 FEET

61

N

1 Mile

5 000 Feet

Scale 1:15 840

HARRISBURG
(state capital and county seat)

PAXTANG

OAKLEIGH

STEELTON

ENHAUT

Oberlin Gardens

Bressler

City Island

Sheesly Island

Redbuds Island

Hess Island

Stucker Island

SUSQUEHANNA RIVER

CUMBERLAND COUNTY

YORK CO.

Foose School

Trinity Church

Filtration Plant

Grace Church

St James Church

County Home

County Prison

Steelton Highspire High School

St Ann School

St Johns School

St Peters Church

St Marys Church

CALVARY CEMETERY

MIDLAND CEMETERY

CEMETERY

QUARRY

Reservoir

Spring Creek

Paxton Creek

Reading Creek

SWATARA

PENN CENTRAL

READING

WALL STREET

MARKET STREET

PENN STREET

BRIDGE

DAM

SOUTH

Ua Ub Us Ta Rv Lt At Ma

HaC2 HaB2 DuB2 DvB2 BeB2 BeC2 BkD2 WeE2 WeD2 LeB2 CnC2 CoB2 BtB2 BkC2 BeA

N

339 000 FEET

(Joins sheet 58)

2 260 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 61)

(Joins sheet 63)

(Joins sheet 66)

2 280 000 FEET

326 000 FEET

LAWNTON

HOLY CROSS CEMETERY

READING

FRANKLIN

BENJAMIN

HIGHWAY

Chamber Hill School

Chamber Hill Church

Swatara Crest

S W A T A R A

UNDERGROUND CABLE

TELEPHONE

APPROXIMATE LOCATION

Swatara Jr High School

OBERLIN

CHURCHVILLE CEMETERY

STEELTON

Laurel Run

QUARRY

Ebenezer

L O W E R S W A T A R A

UNDERGROUND TELEPHONE CABLE

APPROXIMATE LOCATION

(Joins sheet 59)

339 000 FEET

2 280 000 FEET

(Joins sheet 62)

(Joins sheet 64)

(Joins sheet 67)

326 000 FEET

2 300 000 FEET

63

N

1 Mile

5 000 Feet

Scale 1:15 840

SWATARA

LOWER SWATARA

DERRY

LONDONDERRY

Stoverdale Station

Stoverdale Church

Waltonville

Clifton

Stricklers Church

Shopes Church

BENJAMIN FRANKLIN HIGHWAY

READING

CRISSEA

APPROXIMATE LOCATION

SWAMP RUN

HaA HaB2 HaC2 BeB2 BeC2 BkD2 BkC2 BkB2 WeE2 WeD2 BeB2 BeC2 At Ph Lw Ta Ma Hu Lt Ub BeA LrB2 LrC2 LrD2 LsF LsD RdB2 Cy BeC2 BrB2 BrC2 NeC2 Cr NsB NsD Wa Wc LhB2

339 000 FEET

(Joins sheet 60)

2 300 000 FEET

N

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 63)

(Joins sheet 65)

(Joins sheet 68)

2 320 000 FEET

326 000 FEET

D E R R Y

L O N D O N D E R R Y

C O N E W A G O

Conewago School

Hoffer

65

N

339 000 FEET

2 320 000 FEET

(Joins inset)

(Joins sheet 64)

(Joins sheet 69)

(Joins sheet 60)

(Joins upper left)

348 600 FEET

2 323 450 FEET

339 000 FEET

326 000 FEET

2 340 000 FEET

D E R R Y

C O N E W A G O

Bachmanville

Conewago Church

LEBANON COUNTY

LrB2 LrC2 LrD2 LsD LsF LhB2 PeB2 PeC2 BrB2 BrC2 NeC2 AsB2 KaC2 KaD2 RdB2 LrD2 Bc Cr At Bb NsB HaA DuB2 BeB2 HaB2 HaC2 Ta

1 Mile

5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

1 000 2 000 3 000 4 000 5 000

N

(Joins sheet 62)

326 000 FEET

2 260 000 FEET

(Joins inset, sheet 70)

1 Mile

5 000 Feet

Scale 1:15 840

SWATARA

QUARRY

LIMESTONE

STEELTON

East End School

Zimmerman Island

Calver Island

Hoak Island

Fritz Island

SWATARA

LOWER SWATARA

Greenwood Hills

HIGHSPIRE

CEMETERY

INTERCHANGE 19

PENNSYLVANIA TURNPIKE

LOCATION

APPROACH AVE

PENN CENTRAL

Jednota

Meade Heights

GRAVEL PIT

intermittent water

water

OLMSTED STATE AIRPORT

SUSQUEHANNA RIVER

YORK COUNTY

(Joins sheet 67)

(Joins sheet 70)

313 000 FEET

2 280 000 FEET

(Joins sheet 63)

(Joins sheet 66)

(Joins sheet 68)

(Joins sheet 71)

326 000 FEET

313 000 FEET

2 280 000 FEET

2 300 000 FEET

67

N

1 Mile

5 000 Feet

Scale 1:15 840

SWATARA

LONDONDERRY

Freys Grove

Round Top

Grandview School

St Peters Church

St Marys School

Feaser School

MIDDLETOWN

Mansberger School

ROYALTON

Northumberland School

Riverside Church

Township School

Swatara Church

OLMSTED STATE AIRPORT

Service Facilities

Iron Run

Reservoir

CREEK

QUARRY

PENNSYLVANIA TURNPIKE

UNDERGROUND TELEPHONE

PENN CENTRAL

READING

APPROXIMATE LOCATION

intermittent

441 76 230 341 30

68
N

326 000 FEET

(Joins sheet 64)

2 300 000 FEET

1 Mile
5 000 Feet

Scale 1:15 840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 67)

Round Top

Schenks Church

Deodate

Conewago Church

L O N D O N D E R R Y

C O N E W A G O

PENNSYLVANIA TURNPIKE

APPROXIMATE LOCATION

Lynch Run

Brills Run

Conewago Creek

LANCASTER CO

(Joins sheet 72)

(Joins sheet 69)

313 000 FEET

2 320 000 FEET

(Joins sheet 65)

(Joins sheet 68)

326 000 FEET

2 320 000 FEET

2 340 000 FEET

313 000 FEET

69

N

1 Mile

5 000 Feet

Scale 1:15 840

PeB2 PeC2 KaC2 KaB2 RdB2 AsB2 LrC2 PnB2 At Bc Cr Ub

PENNSYLVANIA TURNPIKE

LEBANON COUNTY

LANCASTER COUNTY

C O N E W A G O Creek

Holfer Creek

Conestoga

N

1 Mile 5 000 Feet

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

Scale 1:15 840

313 000 FEET

2 260 000 FEET

(Joins sheet 66)

L O W E R S W A T A R A

Ua OLMSTED STATE AIRPORT

S U S Q U E H A N N A R I V E R

Little Stony Island

Rv

Sassafras Island

Rv

Rv

YORK COUNTY

Hill Island

NsB

NsD

DvB2

BrC2

L O N D O N D E R R Y

(Joins sheet 71)

326 000 FEET

2 249 425 FEET

(Joins sheet 61)

S U S Q U E H A N N A R I V E R

Ua

Ua

WgB2

DvB2

STEELTON

LIMESTONE QUARRY

PENN CENTRAL

PENN CENTRAL

Md

Ua

YORK COUNTY

Bingo Island

Rv

Zimmerman Island

Rv

Rv

Ta

S W A T A R A

Rv

Tg

Hoak Island

Lt

Ta

(Joins sheet 66)

2 260 000 FEET

317 140 FEET

300 000 FEET

2 280 000 FEET

71
N

313 000 FEET

2 280 000 FEET

OLMSTED STATE AIRPORT

MIDDLETOWN

ROYALTON

LOWER SWATARA

SUSQUEHANNA RIVER

Poplar Island

Fall Island

Henry Island

Kohr Island

Goosehorn Island

Shelley Island

Threemile Island

OLMSTED AIR FORCE BASE

GRAVEL PIT

PENN CENTRAL

LONDONDERRY

Geyers Church

Conewago

LANCASTER CO

(Joins sheet 67)
(Joins sheet 70)
(Joins sheet 72)
(Joins sheet 73)

1 Mile
5 000 Feet
Scale 1:15 840

2 300 000 FEET

300 000 FEET

72

N

313 000 FEET

(Joins sheet 68)

2 300 000 FEET

1 Mile

5 000 Feet

Scale 1:15 840

(Joins sheet 71)

(73)

2 320 000 FEET

300 000 FEET

LONDONDERRY

CONEWAGO

LANCASTER COUNTY

UNDERGROUND

TELEPHONE

CABLE

PENN CENTRAL

Lynch Run

Bruce Run

Conewago Creek

Conewago Creek

LhB2 PeB2 KaC2 PeC2 RdB2 BrB2 BrC2 Us At Bc KaB2 AsB2 Cr LrB2 KaD2 NeC2 NsB NsD Wa Na2 AbA Bb

(Joins sheet 71)

73

N

300 000 FEET

2 280 000 FEET

2 300 000 FEET

287 000 FEET

SUSQUEHANNA RIVER

LONDONDERRY

LANCASTER COUNTY

YORK COUNTY

LANCASTER COUNTY

Shelley Island

Beech Island

Threemile Island

Bashore Island

Creek

Conewago Creek

PENN CENTRAL

441

Rv Ta Tg Lw CnA CnC2 CnB2 LeB2 DvA DvB2 PeB2 PeC2 KaD2 AbB2 Bb Bc

1 Mile

5 000 Feet

Scale 1:15 840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000